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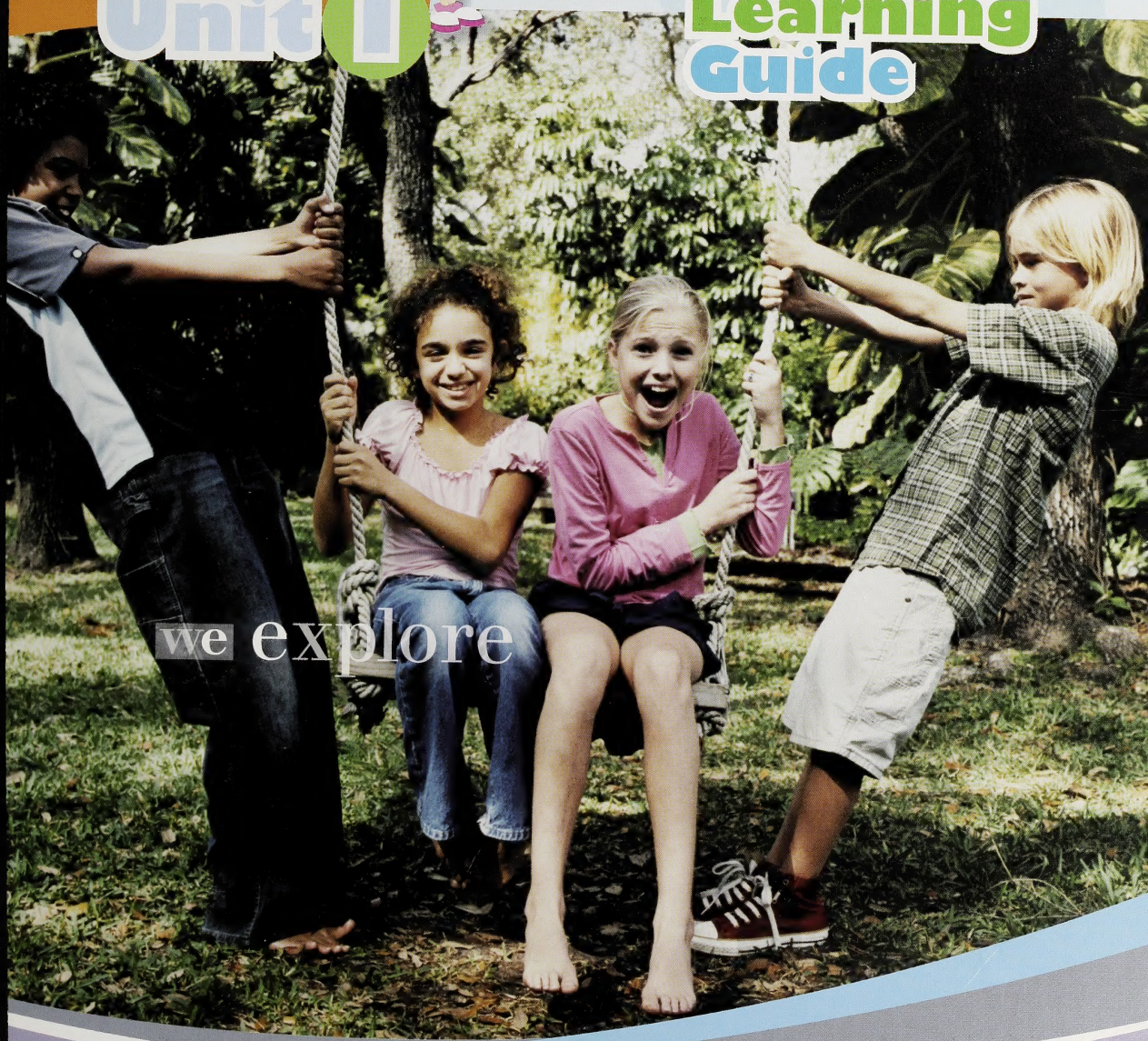
LearnEveryWare

Math 5 Unit 1

Student Learning Guide



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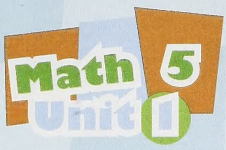

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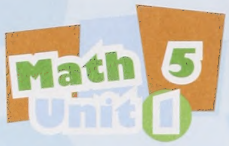

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Math 5 Unit 1

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Math 5 Unit 1

Lesson 1

Numbers Large and Small

Nobel Prize

Each year since 1901 a committee awards the Nobel Prizes. The prizes go to individuals or groups that show outstanding achievement in the areas of:

- physics
- chemistry
- economics
- physiology or medicine
- literature
- peace

Most prizes are awarded at ceremonies in Stockholm, Sweden. The Peace Prize is awarded in Oslo, Sweden.

In 1895 Alfred Nobel left his wealth to establish these awards. Invitations to nominate people or groups are sent to thousands of members of academies, universities, scientists and others every year. Each person given this award receives a medal, personal diploma and a cash award. In the year of 2007 the cash award was 10 000 000 SEK (Swedish Kronor) or about 1 600 000 Canadian dollars.

Front Back

One winner of the Nobel Prize for Peace is Betty Williams. She witnessed an act of hatred and began collecting signatures on a petition for peace. She collected 6 000 signatures and then led a peaceful protest march of 10 000 people. She led a second peaceful protest march one week later of 35 000 people. She became the co-founder of the Ireland Peace Movement. Her act of peace has changed many lives.

There are a lot of large numbers in the information above.

Reflection

How do you write large numbers?
How do you know the size of the numbers?

Objectives for this Lesson

In this lesson you will explore the following concepts:

- Write a given numeral, using proper spacing
- Describe the pattern of adjacent place positions, moving from right to left
- Provide examples of large numbers used in print or electronic media

Base Ten System

The system that is used for writing numbers is a base ten system.

Reflection

Why is our number system based on the number 10?

In the Base Ten System you use ten symbols called **digits**. These digits are 0, 1, 2, 3, 4, 5, 6, 7, 8 and 9. When you write numbers in the base ten system each of the digits has a specific value. This value is determined by its position or "place" in the number. That is why you call it a **Place Value System**. When you write a number using the numerals 0 through 9 it is called **standard form**.

Example 1

Write the number in standard form:

One million, three hundred seventy-two thousand, nine hundred fifty-six

The number one million, three hundred seventy-two thousand, nine hundred fifty-six is written 1 372 956 in standard form.

Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
1	3	7	2	9	5	6

Each place has a specific value.

Number	Place	Value
1	Millions	1 000 000
3	Hundred Thousands	300 000
7	Ten Thousands	70 000
2	Thousands	2 000
9	Hundreds	900
5	Tens	50
6	Ones	6

When you write larger numbers like this, leave a blank space in between each group of 3 digits. A single space is placed between these groups to identify the thousands and millions. Beginning with the digit in the ones place, you count 3 places and leave a space before writing the next 3 numbers.

Example 2

Write 2347564 in standard form.

You would begin with the digit in the ones place, which is the number 4.

2347564

Start at the far right and count three places to the left.

2347 | 564

You would leave a space between the number 5 and 7.

2347 564

You would then begin with the number 7 and count 3 places to the left. Leave a space between the number 3 and 2.

2 | 347 564

Your written number would look like this: 2 347 564

Now It's Your Turn

Write each of the following in standard form.

a. five million, nine hundred eighty-two thousand, five hundred seventy-six

b. 1300500

c. 238406

Solutions

a. 5 982 576

b. 1 300 500

c. 238 406

- In your Workbook go to Unit 1, Lesson 1 and complete 1 to 9.

The Pattern of Place Positions

You may have noticed a pattern in Example 1 that is based on the number 10. Each of the places has a value that is 10 times the value of the number to the right of it. An example would be that 100 is 10 times as much as 10.

Place	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
Value	1 000 000	100 000	10 000	1 000	100	10	1

As you can see from the values that go with each place, starting on the right with 1, you simply multiply by 10 to get the value of the next position.

- In your Workbook go to Unit 1, Lesson 1 and complete 10 to 12.

Let's Explore

Exploration 1: Create Large Numbers

Materials: Unit 1, Lesson 1, Exploration 1 page from your Workbook, 2 sets number cards (0 - 9)

1. Mix the card sets and place them face down in a stack. Draw three cards and place them in random order.

   Write the number in Place Value Chart A on your Workbook page.

   Can you rearrange the three cards to make it a larger number? If so, rearrange the cards and then write the number beside your original answer for number 1.

2. Draw one card from the stack and place it at the end of the three digit number. Write the number in Place Value Chart B on your Workbook page.

   What place could you have put it in to make the largest possible number?

   Rearrange the numbers and then write the number beside your original answer for number 2.

3. Draw one card from the stack and place it at the end of the four digit number. Write the number in Place Value Chart C on your Workbook page.

   What place could you have it in to make the largest possible number?

   Rearrange the number and then write the number beside your original answer for number 3.

4. Put all of the cards back together. Using all of the cards choose the five that will make the largest five digit number. Place them in the correct order and then write the number in Place Value Chart D. Label all of the place values also.

5. Put all of the cards back together. Using all of the cards choose the five that will make the smallest five digit number. Place them in the correct order and then write the number in Place Value Chart E.

Large Numbers in Print and Electronic Media

As you read, research, or study you will find large numbers in many areas. Everyday life is filled with stock market statistics, agricultural results and even the Census of Canada, to name a few.

March 28, 2008 at 9:36 AM MST

Earth Hour: Global Initiative to Cut Power Consumption

Tomorrow evening Daksha Singh is going to take a walk. At 8 p.m., this young student and budding business leader will turn off all of the energy eating non-essential appliances in his family's home in suburban Calgary. Every computer, TV, and clock radio will go dark for an hour. Mr. Singh says he plans to "go for a walk" during that time.

Even at his young age, Mr. Singh is already a student school trustee and nominee for the Alberta Green Award. He is one of more than 240,000 people and 17,000 businesses all over the planet who will take part in Earth Hour. This initiative is calling for the reduction of power usage for 60 minutes. You can bet that many more will join in before the appointed hour tomorrow.

Source: The Edmonton Tribune

In a small portion of this article you can see 2 large numbers:

240,000 people

17,000 businesses

In standard form:

240 000 people

17 000 businesses

Large numbers are found in many types of media. There are newspapers, magazines, encyclopaedias, and endless Internet resources.

Example 3

On the Internet, find three examples of large numbers in everyday life, using the Statistics Canada website.

Log on to Statistics Canada www.statcan.ca

Search to find large numbers. Describe your number, name the number in standard form, and name the source of the number.

Description	Number	Source
2006 Canadian Census population	31 612 867	www.statcan.ca
Number of Canadian households in 2006	12 700 000	www.statcan.ca
Number of farms in Canada in 2001	246 923	www.statcan.ca

Exploration 2: Large Numbers and Place Value

Materials: Unit 1, Lesson 1, Exploration 2 page from your Workbook, Magazine of your choice, Scissors, Tape or glue

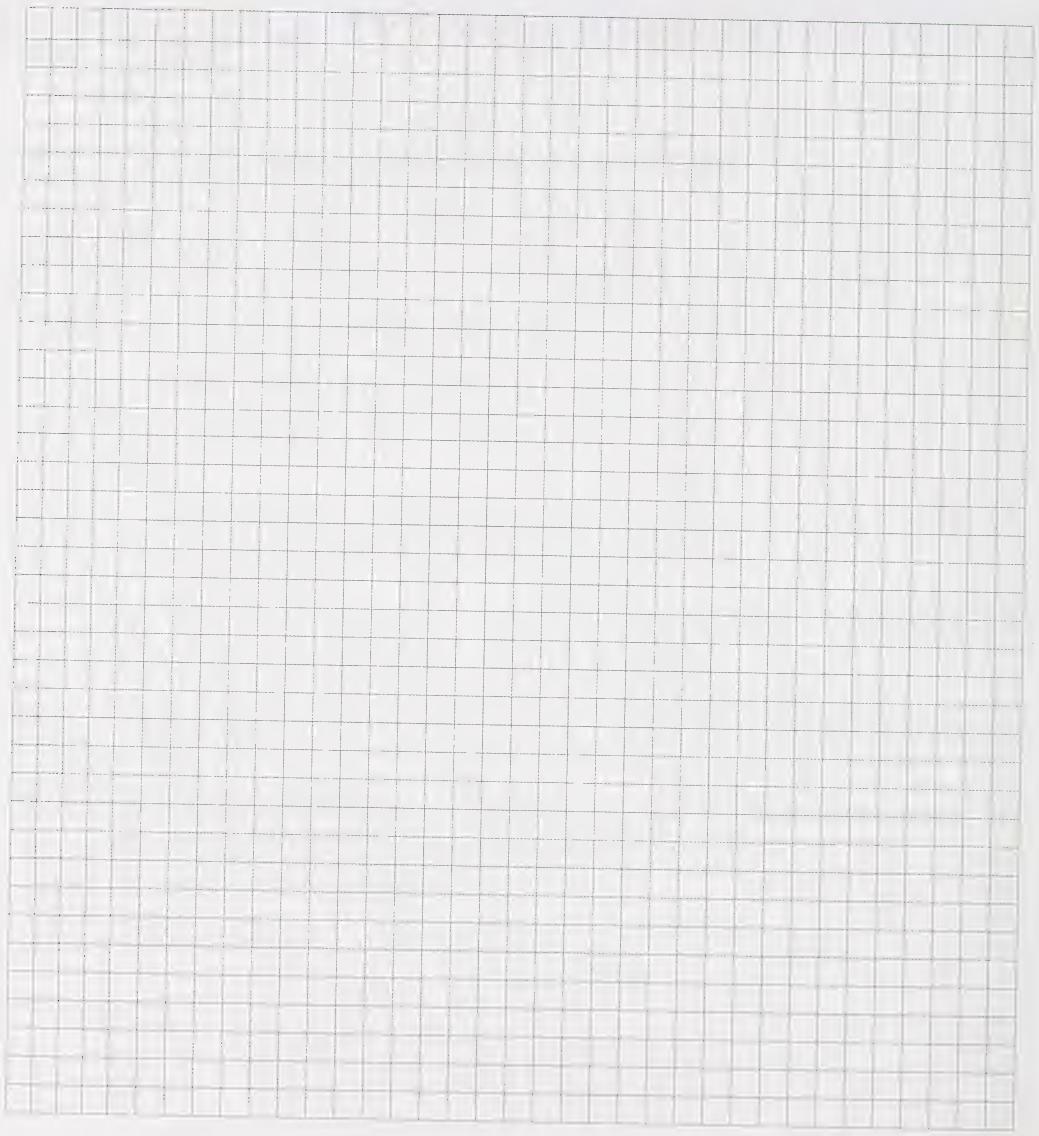
Use the magazine to answer the following problems:

1. Find a number with three digits. Cut it out and glue or tape it following number 1 on your Workbook page. Circle the number in the tens place.
2. Find a number with four digits. Cut it out and glue or tape it following number 2. Circle the number in the thousands place.
3. Find a number with four digits. Cut it out and glue or tape it following number 3. Circle the number in the hundreds place.
4. Find a number with four digits. Cut it out and glue or tape it following number 4. Circle the number in the ones place.
5. Find a number with five digits. Cut it out and glue or tape it following number 5. Circle the number in the tens place and underline the number in the ten thousands place.

Let's Practice

- In your Workbook go to Unit 1, Lesson 1 and complete 13 to 21.

Go online to complete the Concept Capsule: Super Large Numbers.



Lesson 2

Place Value

Canada's Longest Bridge

Traveling to Prince Edward Island from New Brunswick was accomplished by many different types of transportation. Many years ago people would kayak or even walk across the strait when it was frozen. Ferries were used until the opening of Confederation Bridge in 1997. Construction on this bridge began in 1993 and was completed four years later. It is the largest bridge in Canada with a length of 12.9 km. It is the 13th longest bridge in the world!

Look at the following interesting information:

- Cost to build: $1 300 000 000
- Over 5 000 workers were needed to build bridge
- Before the bridge 740 000 tourists crossed the water each year. After the bridge 1 200 000 crossed each year
- 75 000 people participated in a Walk or Run event across the bridge on the day of its opening

This is quite an impressive structure! Can you imagine being the accountant in charge of keeping up with all of that information?

Reflection

Where else can you find large numbers like the ones in the information about the Confederation Bridge?

Objectives for this Lesson

In this lesson you will explore the following concepts:

- Describe the meaning of each digit in a given numeral
- Express a given numeral in expanded notation
- Write the numeral represented by a given expanded notation

Go online to complete the Concept Capsule: Place Value to 100 000.

Place Value

The place value system gives you the meaning of each digit in a number. Did you know that a 9 is not always larger than a 3? In the number 3 869 572 the 9 has a very different meaning than the 3. Look at the following values:

Number	Place	Value
3	Millions	3 000 000
8	Hundred Thousands	800 000
6	Ten Thousands	60 000
9	Thousands	9 000
5	Hundreds	500
7	Tens	70
2	Ones	2

Notice that the 9 means 9 000 and the 3 means 3 000 000. It all depends on place value. Read the following example to understand further.

Example 1

Complete the place value chart for 3 409 275 and determine the value of each digit.

The number is in standard form. The place value chart allows you to determine the value of each digit.

Here is the place value chart:

Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
3	4	0	9	2	7	5

Remember, the value is determined by the name of the place:

Place	Millions	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
Value	1 000 000	100 000	10 000	1 000	100	10	1

The value of a number in the tens place is ten times the digit. To find the value of each digit multiply by the value. Notice that it is the same as writing the digit with the same number of zeros as the place value. Here are the values of each digit:

Number	Place	Value
3	Millions	3 000 000
4	Hundred Thousands	400 000
0	Ten Thousands	0
9	Thousands	9 000
2	Hundreds	200
7	Tens	70
5	Ones	5

In this number 0 has a very important job - it is called a place holder. It "holds" the ten thousands place so that the 4 can be in the hundred thousands place.

Now It's Your Turn

Use the following number to answer the questions:

3 624 109

a. Which number is in the thousands place?

b. Which number is in the hundred thousands place?

c. Write the following number in standard form: two million, seven hundred twenty–three thousand, four hundred fifty–one.

d. Determine the value of each digit in the number 8 704 658.

Solutions

a. 4

b. 6

c. 2 723 451

d.

Number	Place	Value
8	Millions	8 000 000
7	Hundred Thousands	700 000
0	Ten Thousands	0
4	Thousands	4 000
6	Hundreds	600
5	Tens	50
8	Ones	8

Let's Practice

- In your Workbook go to Unit 1, Lesson 2 and complete 1 to 7.

Expanded Notation

There are many different ways to represent numbers when you are writing them. When you write a number using the numerals 0 through 9 it is called standard form. When you write a number in **expanded notation** you are showing that number as the sum of the values of each of its digits. In order to do this, write the value of each digit from greatest to least place value position as a separate term.

Example 2

Write 7 931 in expanded notation.

You may want to start by figuring out the place value of each number. An easy way to do this is to complete a place value chart like this:

Ten Thousands	Thousands	Hundreds	Tens	Ones
	7	9	3	1

You need to find the value of each digit using the place value:

$(7 \times 1\,000) + (9 \times 100) + (3 \times 10) + (1 \times 1) = 7\,000 + 900 + 30 + 1$

Now write it in expanded notation: $7\,931 = 7\,000 + 900 + 30 + 1$

Example 3

Write 29 035 in expanded notation.

Figure out the place value of each digit:

Ten Thousands	Thousands	Hundreds	Tens	Ones
2	9	0	3	5

Find the value of each digit:

(2 x 10 000) + (9 x 1 000) + (3 x 10) + (5 x 1) = 20 000 + 9 000 + 30 + 5

Expanded notation:

29 035 = 20 000 + 9 000 + 30 + 5

When a number has a zero as a place holder, that zero may be left out when writing expanded notation.

7 021 = 7 000 + 20 + 1

When you are changing from expanded notation to standard form remember to put those zeros back in the number.

20 000 + 3 000 + 50 = 23 050

Example 4

Write 20 000 + 7 000 + 50 + 1 in standard form.

Figure out where each number fits in the place value chart:

Ten Thousands	Thousands	Hundreds	Tens	Ones
2	7		5	1

Put zeros in all empty place values and then write the number:

Ten Thousands	Thousands	Hundreds	Tens	Ones
2	7	0	5	1

20 000 + 7 000 + 50 + 1 = 27 051

Now It's Your Turn

Write the following in standard form:

a. three thousand, four hundred twenty–five

b. 2 000 000 + 900 000 + 3 000 + 70 + 6

Complete the following questions in expanded notation:

c. 1 753 = (____ x 1 000) + (____ x 100) + (__ x 10) + (__ x 1) = _____ + _____ + _____ + _____

d. 5 690 = (5 x ____) + (6 x ____) + (9 x ____) = _____ + _____ + _____

Write in expanded notation:

e. 275 318

f. 1 350 972

Solutions

a. 3 425

b. 2 903 076

c. 1 753 = (1 x 1 000) + (7 x 100) + (5 x 10) + (3 x 1) = 1 000 + 700 + 50 + 3

d. 5 690 = (5 x 1 000) + (6 x 100) + (9 x 10) = 5 000 + 600 + 90

e. 275 318 = (2 x 100 000) + (7 x 10 000) + (5 x 1 000) + (3 x 100) + (1 x 10) + (8 x 1) = 200 000 + 70 000 + 5 000 + 300 + 10 + 8

f. 1 350 972 = (1 x 1 000 000) + (3 x 100 000) + (5 x 10 000) + (9 x 100) + (7 x 10) + (2 x 1) = 1 000 000 + 300 000 + 50 000 + 900 + 70 + 2

Exploration 1: Matched Pairs

Materials: Unit 1, Lesson 2, Exploration 1 page from your Workbook, 30 Index cards, Pencil or marker

In this activity you will be making your very own memory game.

1. Write each of the following numbers on 1 index card:

   6 819, 12 503, 470 115, 898, 95 721, 3 416, 75 383, 1 800 992, 407, 234 091, 2 787 443, 9 055, 913, 81 632, 186 975
   This will be a total of 15 cards.

2. For each of the cards that you just filled out, you will make a partner card for it with the 15 blank cards that are left. For each of the numbers on one card, make a matching card for it by writing the number in expanded notation. Example:

   Card: 6 819
   Matching Card: (6 x 1 000) + (8 x 100) + (1 x 10) + (9 x 1)

3. Now that you have 15 pairs of cards place them in a stack face down. Shuffle the cards and then place them in 5 rows of 6 cards each.

4. Turn over two cards at a time. If the number and the expanded notation are the same, you have made a match. If they are not a match turn them back over and try again. You will continue playing until you have matched all of the pairs.

- In your Workbook go to Unit 1, Lesson 2 and complete 8 to 15.

Go online to watch the Notepad Tutor: Place Value to 100 000 000.

Lesson 3

Estimation

Construction Costs

Building any type of structure can be a difficult process if you are not organized and well prepared. Important things to know before you begin building are:

- How much it is going to cost?
- How long will it take?

It is impossible to know exactly how much it will cost. Construction professionals create an estimate for the property owner. The contractor uses the floor plans of the structure to determine all of the materials needed. Then they decide how long it will take to actually build it. They can calculate the amount of materials needed fairly easily. It is much more difficult to estimate time. The schedules of all of the teams of workers and the weather can create delays. Here is an example of a contractor's planning sheet:

Site preparation	2 weeks
Foundation	1 week
Framing	3 weeks
Electrical	2 weeks
Plumbing	1 week
Roofing	2 weeks
Interior Finish Work	8 weeks
Exterior Finish Work	4 weeks
Total	**23 Weeks**

23 weeks is about 6 months.

Reflection

How do you estimate amounts?

Objectives for this Lesson

In this lesson you will explore the following concepts:

- Use estimation strategies that include front-end rounding in problem-solving contexts

- Use estimation strategies that include compensation in problem-solving contexts
- Use estimation strategies that include compatible numbers in problem-solving contexts

Go online to watch the Notepad Tutor: Estimating Quantities Using Referents of 10 and 100.

Front-End Rounding

Estimation is a really important tool in our world today. You may need to know approximately how much money you need at a store or about how long it will take to complete a task. When you estimate, you are finding an approximate answer. It is an answer that is close to the exact answer. One type of estimating is called **front-end rounding**. It is a way of estimating that uses the largest, or greatest, digits to find an approximate answer.

To estimate sums by front-end rounding:

1. Add the front digits (the largest place value) and write zeros for the other digits.
2. Adjust your estimate by estimating the back digits (the numbers in the smaller place values) and adjusting your answer.

Study the following example.

Example 1

Estimate the sum using front-end rounding.

3 271 + 850 + 2 983 + 1 125

Rough Estimate		Adjusted Estimate	
3 271		3 271	271 + 850 = about 1 000
850		850	
2 983		2 983	983 + 125 = about 1 000
+1 125		+1 125	
6 000			1 000 + 1 000 = 2 000
Rough estimate: 6 000 This estimate is found by adding the thousands only.		Adjusted estimate: 6 000 + 2 000 Note that here we estimate the value of the hundreds and add it to the rough estimate of the thousands.	

3 271 + 850 + 2 983 + 1 125 is about 8 000

The estimated sum is LESS THAN the actual sum would be. Why do you think this is true? Look at the adjusted estimate:

271 + 850 + 983 + 125

The ones and tens places have all been left off in the front-end estimation. Adding these numbers back would make the actual sum more than the adjusted estimate.

Estimating differences using front-end rounding is similar, but there is no adjusted estimate with the back digits.

To estimate differences using front-end rounding:

1. Subtract the front digits.
2. Write zeros for the other digits.

Example 2

Estimate the difference using front-end rounding.

9 354 – 3 691

Subtract the front digits:

$$\begin{array}{r} 9\,354 \\ -3\,691 \\ \hline 6 \end{array}$$

Write zeros for the other digits:

$$\begin{array}{r} 9\,354 \\ -3\,691 \\ \hline 6\,000 \end{array}$$

The estimated difference is: 6 000.

Now It's Your Turn

Estimate the sum in the following questions, using front-end rounding:

a. $\begin{array}{r} 3\,897 \\ -1\,625 \\ \hline 2\,941 \end{array}$

b. 218 + 4 763 + 5 310

Estimate the difference in the following questions, using front-end rounding:

c. $\begin{array}{r} 6\,273 \\ -4\,861 \end{array}$

d. 5 275 – 618

Solutions:

a. 6 000 + 2 000 = 8 000

b. 9 000 + 1 000 = 10 000

c. 2 000

d. 5 000

- In your Workbook go to Unit 1, Lesson 3 and complete 1 to 10.

Compensation

A second strategy that can be used for estimation is **compensation**. This is a process where you take part of the value of one number and give it to another number to help in solving the problem. It is usually performed mentally but you can also use pencil and paper to work it out.

Study the following example.

Example 3

Find the sum using compensation: 6 + 9

Borrow 1 from the 6 and add it to the 9.

(6 – 1 = 5 and 9 + 1 = 10)

The problem then becomes 5 + 10.

Solve the problem. This is simpler than the original problem.

5 + 10 = 15

6 + 9 = 15

Now It's Your Turn

Find the sum in the following questions, using compensation:

a. 19 + 6

b. 31 + 29

Solutions:

a. 20 + 5 = 25

b. 30 + 30 = 60

Let's Practice

- In your Workbook go to Unit 1, Lesson 3 and complete 11 to 15.

Compatible Numbers

The third estimating strategy in this lesson is using **compatible numbers** to solve the problem. This is a way to estimate answers in division problems. These numbers are easy to compute mentally. Two numbers are compatible if one divides evenly into another.

To estimate answers to division problems using compatible numbers:

1. Choose a basic fact that relates to the problem.
2. Divide.

Study the following examples.

Example 4

Estimate the answer using compatible numbers.

3 175 ÷ 4

Think of a basic fact that relates to the problem: 32 ÷ 4 = 8

Divide: 3 200 ÷ 4 = 800

3 175 ÷ 4 is about 800

Example 5

Estimate the answer using compatible numbers.

16 793 ÷ 4

Think of a basic fact that relates to the problem: 16 ÷ 4 or 20 ÷ 4.
You may use different sets of numbers to estimate an answer.

Divide: 16 000 ÷ 4 = 4 000

20 000 ÷ 4 = 5 000

Both estimates are correct and the answer will be between 4 000 and 5 000.

16 793 ÷ 4 is between 4 000 and 5 000.

Let's Explore

Exploration 1: Let's Go on a Vacation!

Materials: Unit 1, Lesson 3, Exploration 1 page from your Workbook, Paper, Pencil, Internet connection

You are going to get to go on vacation for 3 nights to New York City! It is all up to you to make the plans on how to get there, where to stay, how to much to spend on eating, and what to see or do while you are there. Do the following to make your plans:

1. Choose the type of transportation you will use. Your choices are car, train, bus and airplane. Research how much it will cost to get to and from New York. Write your choice and the amount that it will cost on your Workbook page.

2. Choose which hotel that you will stay in. How much will it be for a three night stay? Write your hotel name and the cost on your Workbook page.

3. Choose how much you will spend each day on three meals. Write the total amount for 3 days on your Workbook page.

4. Choose three things you would like to do or go see while you are there. How much will each one cost? Write your three places or things on your Workbook page and the amount it will cost.

5. Once you have made all of your choices you will need to find the estimate of how much the trip will cost. You may use any of the types of estimation in this lesson. List what kind of estimation you are using and then show your work for finding the total amount. Are you surprised at how much it costs to go on vacation?

Now It's Your Turn

Estimate the answer to each division problem using compatible numbers.

a. 4 419 ÷ 4

b. 12 698 ÷ 6

c. 51 683 ÷ 5

d. 81 295 ÷ 9

Solutions:

a. 4 000 ÷ 4 = 1 000

b. 12 000 ÷ 6 = 2 000

c. 50 000 ÷ 5 = 10 000

d. 81 000 ÷ 9 = 9 000

Let's Practice

- In your Workbook go to Unit 1, Lesson 3 and complete 16 to 21.

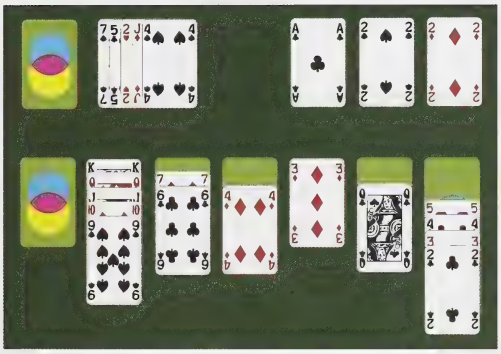
Math 5 Unit 1

Lesson 4

Mental Math

Playing Solitaire

A popular game on a computer or with cards is called Solitaire. You make patterns with the cards that are based on number and colour. Here you can see that the pattern is descending.



There are all kinds of number patterns. They can increase or decrease. You can use these patterns to come up with easy ways to do math computations.

Reflection

How do you multiply numbers in your head?

Objectives for this Lesson

In this lesson you will explore the following concept:

- Apply mental mathematics strategies to number properties and multiplication

Sometimes you just need to get the answer fast. Want to learn some tricks that will help you multiply numbers fast? These tricks will also help you maintain your basic facts.

Skip Counting

This method is great for counting many items quickly or working multiplication facts.

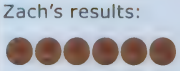
You should remember how to count by two. Counting by 2 is a great shortcut to count things.

Cameron and Zach each have a stack of pennies to count. They both have the same amount, but they need to know how many. If Zach counts his pennies one at a time (1, 2, 3 ...) and Cameron counts his two at a time (2, 4, 6 ...) who would finish first?

Cameron's results:

2 4 6 8 10 12 ...and so on...

Zach's results:



1 2 3 4 5 6 ...and so on...

Skip counting may be done by any grouping. You may remember some of the more common ones:

Skip Counting	
... by two	2, 4, 6, 8, 10, 12,...
... by five	5, 10, 15, 20, 25,...
... by ten	10, 20, 30, 40, 50,...

For working with larger multiplication problems you may want to be prepared to count by larger numbers:

Skip Counting	
... by seven	7, 14, 21, 28,...
... by eight	8, 16, 26, 32,...
... by twelve	12, 24, 36, 48,...

Now let's use skip counting to complete some patterns.

Now It's Your Turn

Complete the following on your own paper:

a. Use skip counting by seven to complete:

49						91			112

b. Use skip counting by eight to complete:

96					136				168

c. Use skip counting by fifteen to complete:

45			90			

Solutions:

a.

49	56	63	70	77	84	91	98	105	112

b.

96	104	112	120	128	136	144	152	160	168

c.

45	60	75	90	105	120	135

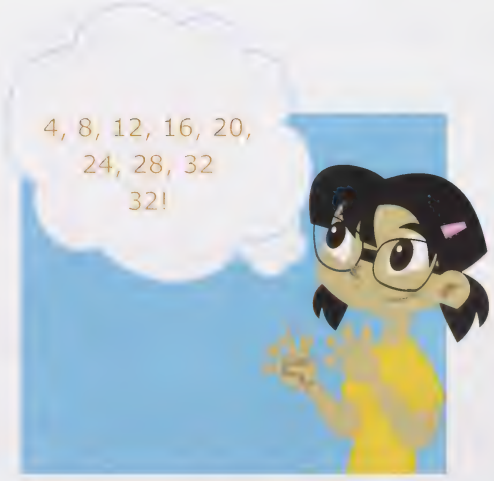
More Skip Counting

How can skip counting help you with math problems?

Let's say you're stuck with a problem in multiplication like:

8 x 4

You've forgotten the answer and you need to do this fast. Remember back in first grade when you would use your fingers to count to 10? Now you can use them to count by other numbers. If you can skip count by four, then you can solve this problem by skip counting by four, 8 times, to get the answer:



Track the number of 4s on your fingers (in this case up to 8). When you get to eight you can stop counting by four and you have your answer!

By skip counting with the larger number you can complete the problem even faster:

8 x 4 Skip count by 8, four times: 8, 16, 24, 32
The answer is 32.

Example 1

Use the mental math strategy of skip counting to solve.

15 x 4

Skip count by 15, four times. The fourth number you get will be the answer:

15, 30, 45, 60

Another way of doing this is to skip count by 4, fifteen times. The fifteenth number you get will be the answer.

4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60

Most of your multiplication facts can be done in this way. Now try the following using this skip counting method.

Let's Practice

- In your Workbook go to Unit 1, Lesson 4 and complete 1 to 13.

Doubles

Another trick that will help you to be fast at multiplication is using **doubles**. The doubles facts for multiplication are very simple to learn.

2 x 2, 3 x 3, 4 x 4, 5 x 5, 6 x 6, 7 x 7, 8 x 8, 9 x 9.

2 x 2 = 4 3 x 3 = 9 4 x 4 = 16 5 x 5 = 25

6 x 6 = 36 7 x 7 = 49 8 x 8 = 64 9 x 9 = 81

Once you have them committed to memory you can use them to find other multiplication facts.

If you know that: 7 x 7 = 49 and you want to find 7 x 8 = ?

Remember: 7 x 7 = 7 + 7 + 7 + 7 + 7 + 7 + 7

That means that: 7 x 8 = 7 + 7 + 7 + 7 + 7 + 7 + 7 + **7**

So, just add 7 to 49 to get 56.

That is one way you can use doubles to help you find the answer to multiplication facts.

Example 2

Use the mental math strategy of doubles to solve.

8 x 9

You know that 8 x 8 = 64 since it is a double.
To get 8 x 9 you need to count up by 8 more.

65, 66, 67, 68, 69, 70, 71, 72

8 x 9 = 72

Example 3

Use the mental math strategy of doubles to solve.

7 x 6

You know that 6 x 6 = 36 since it is a double.
To get 7 x 6 you need to count up by 6 more.

37, 38, 39, 40, 41, 42

7 x 6 = 42

Exploration 1: Patterns of Multiplication

Materials: Unit 1, Lesson 4, Exploration 1 page from your Workbook, 8 pencil crayons

Use the Hundreds Charts found on the Exploration page in your Workbook. Use a different chart for each set of facts:

1. Shade the answers to the 2s facts from 2 x 1 to 2 x 9 using one colour.
2. Extend the pattern you see to all numbers on the chart.
3. Shade the answers to the 3s using another colour.

4. Extend the pattern you see to all numbers on the chart.
5. Shade the answers to the 4s using another colour.
6. Extend the pattern you see to all numbers on the chart.
7. Shade the answers to the 5s using another colour.
8. Extend the pattern you see to all numbers on the chart.
9. Shade the answers to the 6s using another colour.
10. Extend the pattern you see to all numbers on the chart.
11. Shade the answers to the 7s using another colour.
12. Extend the pattern you see to all numbers on the chart.
13. Shade the answers to the 8s using another colour.
14. Extend the pattern you see to all numbers on the chart.
15. Shade the answers to the 9s using another colour.
16. Extend the pattern you see to all numbers on the chart.

Halving and Doubling

The **halving and doubling** strategy can be used when multiplying. This method involves taking half of one number and doubling the other to make a multiplication problem that you remember. This is a great strategy when multiplying by 5 but it can also be used with other numbers.

The process for halving and doubling:	Sample Problem: 14 x 5
1. Double one number:	5 doubled is 10
2. Take half of the second number:	half of 14 is 7
3. Multiply:	10 x 7 = 70

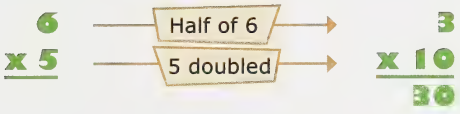
Therefore, 14 x 5 = 70

If you know that 3 x 10 = 30, then you can halve 6 and double 5 to find that 6 x 5 = 30.

Example 4

Use the mental math strategy of halving and doubling to solve.

6 x 5 = ?



6 x 5 = 30

- In your Workbook go to Unit 1, Lesson 4 and complete 14 to 28.

Annexing

To solve a problem like 70 x 5, you can use a method called **annexing**. Since 70 is a multiple of 10, you can ignore the 0 in the number and break the problem into two parts:

1: Drop the zero from the number and multiply.
7 x 5 = 35

2: Add the zero back to the end of your answer.
350

Example 5

Use the mental math strategy of annexing to solve.

800 x 6

1. Drop the zeros from the 800 and multiply:

   8 x 6 = 48

2. Now add the zeros back to the end:

   4800
   800 x 6 = 4 800

Using Distributive Property

When problems have two digit numbers you may feel like you are starting something new. As long as you know your multiplication facts to 10 you are just repeating the use of these facts.

You learned to break a number into expanded notation using place value. You can use that understanding with multiplication.

Example 6

Use the mental math strategy of **distributive property** to solve.

426 x 4

1. Write 426 in expanded notation: 400 + 20 + 6
2. Multiply 4 by each number in the sum (400 x 4) + (20 x 4) + (6 x 4)

   Use annexing: 4 x 4 = 16 add two zeros: 1600
   4 x 2 = 8 add one zero: 80

3. Add the results of each: 1600 + 80 + 24 = 1 704

   426 x 4 = 1 704

Example 7

Use the mental math strategy of distributive property to solve.

653 x 8

1. Write 653 in expanded notation: 600 + 50 + 3
2. Multiply 8 by each number in the sum: (600 x 8) + (50 x 8) + (3 x 8)

   Annexing: 8 x 6 = 48 add two zeros; 4 800

   8 x 5 = 40 add one zero; 400
3. Add the results of each: 4 800 + 400 + 24 = 5 224

   653 x 8 = 5 224

Patterns with Nine

If the patterns with nine have given you trouble in memorizing your facts you are going to love this trick.

Think of the groups of nine:

1 group of 9 is 9	1 x 9 = 9
2 groups of 9 is 18	2 x 9 = 18
3 groups of 9 is 27	3 x 9 = 27
4 groups of 9 is 36	4 x 9 = 36 ... and so on.

Now, look at the pattern in the results. The tens digit of the answer is one less than the number multiplied by 9 and the ones digit plus the tens digit equals 9. Let's try it on the next one:

5 x 9 = 45 4 + 5 = 9

Tens digit: 4
Ones digit: 5
Sum = 9

You can use these to quickly help you work harder problems like a 3-digit number times a 1-digit number.

Example 8

Use the mental math strategy of distributive property and patterns with nine to solve.

592 x 9

Use distributive property:

1. Write 592 in expanded notation; 500 + 90 + 2

2. Multiply each by 9; (500 x 9) + (90 x 9) + (2 x 9)
   Don't forget to use your trick!
   9 x 5 = 45, 9 x 9 = 81 and 9 x 2 = 18

3. Add 4 500 + 810 + 18 = 5 328
   592 x 9 = 5 328

Now It's Your Turn

Use the mental math strategies of annexing, distributive property, and patterns with nine to solve.

a. 38 x 5
b. 70 x 4
c. 21 x 5
d. 870 x 2

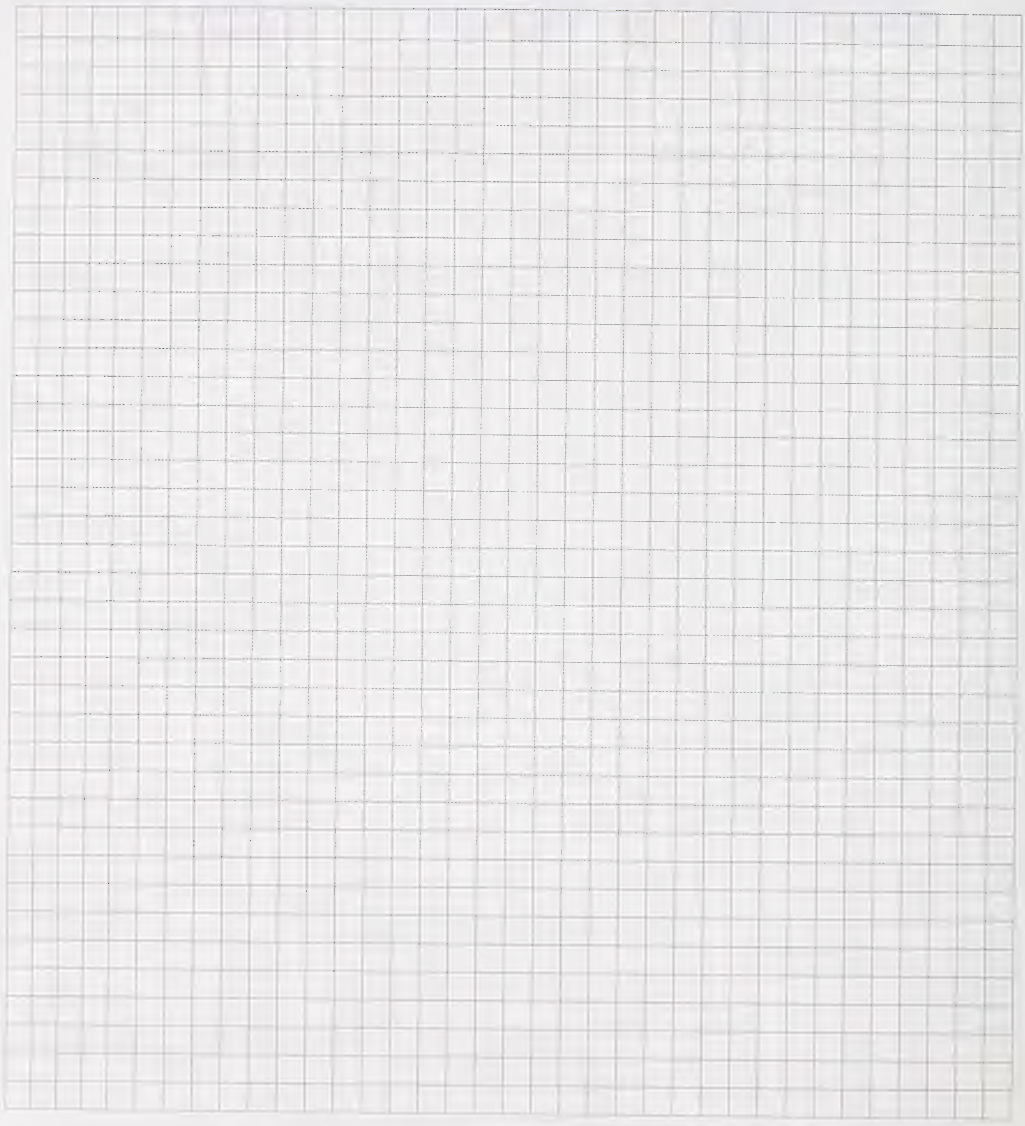
Solutions

a. 190
b. 280
c. 125
d. 1 740

Let's Practice

Go online to watch the Notepad Tutor: Mental Math – Distributive Property.

- In your Workbook go to Unit 1, Lesson 4 and complete 29 to 39.



Lesson 5

Fraction Models

Lacrosse

Lacrosse is a sport that was started by the First Nations people. They played lacrosse to bring honour and glory to their tribe. This sport is very popular across Canada and other nations. Today, box lacrosse or boxla is played indoors in Canada and the United States and in other parts of the world. The playing area is called a box because the game is played indoors in an arena rather than on an outdoor field.

Cameron and Zach are practicing shooting lacrosse goals. Cameron makes 7 out of 10 shots attempted. Zach makes 6 out of 10 shots attempted.

Reflection

What fraction of shots attempted did each boy make?

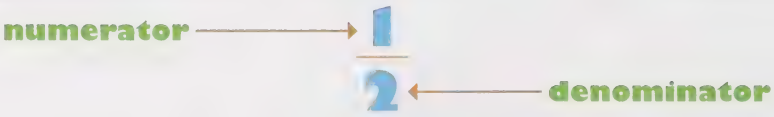
Objectives for the Lesson

In this lesson you will explore the following concepts:

- Create sets of equivalent fractions using concrete and pictorial models
- Compare fractions with like and unlike denominators using concrete and pictorial models

Modelling Fractions

A **fraction** is a number used to name a part of a whole or a group. It has two parts separated by a fraction bar. The number above the bar is called a **numerator** and the number below the bar is called a **denominator**.



Fractions can be used to represent a part of a group:

There are **4** coins in the whole group and **1** of those coins is a nickel.

$\frac{1}{4}$ of the coins are nickels.

There are **3** pennies in the group of **4** coins.

$\frac{3}{4}$ of the coins are pennies.

The denominator represents the number in the whole group.
The numerator represents the number of the part of the whole you are describing.

Fractions may also be used to describe parts of a whole:

4 out of **6** parts of this circle are shaded blue.

$\frac{4}{6}$ of the circle is shaded.

2 out of **6** parts of this circle are not shaded.

$\frac{2}{6}$ of the circle is not shaded.

Example 1

Alyssa bought 5 apples at the store. Two are green and three are red.

What fraction of the apples is green?

$$\frac{\text{Number of Green Apples}}{\text{Total Number of Apples}} = \frac{2}{5}$$

The answer is: $\frac{2}{5}$

Example 2

Lian has some coins in her pocket. $\frac{8}{15}$ of them are nickels. The rest are quarters.

a. What is the total number of coins?
The denominator tells the number of coins. There are 15 coins.

b. How many coins are nickels?
The numerator tells the number of nickels. There are 8 nickels.

c. How many are quarters?
There are 8 nickels and the rest are quarters.
15 – 8 = 7
There are 7 quarters.

Exploration 1: What Fraction of the Bag?

Materials: Unit 1, Lesson 5, Exploration 1 page from your Workbook, Small bag or package of multicoloured objects, Pencil

1. Open your bag of objects and record the name of each colour in the table.

2. Group the objects by colour.
3. Count the number of objects in each group and record in your table.
4. Add up the number of each group to find the total number of objects.
5. Write a fraction for each colour of objects in the bag.

Go online to complete the Concept Capsule: Fractions – Parts of a Set.

- In your Workbook go to Unit 1, Lesson 5 and complete 1 to 13.

Equivalent Fractions

Equivalent fractions have the same value. They will look different but the value is the same because they are the same part of a whole.

This is pictorial representation of $\frac{1}{3}$:

This is a pictorial representation of $\frac{2}{6}$:

Notice that the blue sections are the same size. This means that $\frac{1}{3}$ is equivalent to $\frac{2}{6}$.

Example 3

Write a fraction for each of the models. Are they equivalent?

Figure 1

Figure 2

The fraction for Figure 1 is $\frac{6}{8}$. The fraction for Figure 2 is $\frac{3}{4}$. The figures are the same size and even though they are not positioned the same you can see that the same sized area is shaded.

YES – the fractions are equivalent.

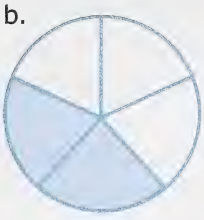
Now It's Your Turn

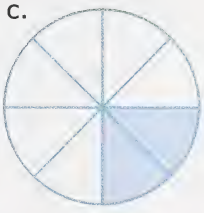
Use the circle given to answer the following on your own paper:

1. Write a fraction for the picture. Hint: What fraction of the circle is shaded?

2. Write a fraction for the shaded region of each circle:

a.

b. 

c. 

3. Which of the picture models in number 2 is equivalent to the circle given in number 1?

4. Using these pictures, complete this statement:
_____ is equivalent to _____.

Solutions:

1. $\frac{1}{4}$

2. a. $\frac{1}{3}$ b. $\frac{2}{5}$ c. $\frac{2}{8}$

3. **c**

4. $\frac{1}{4}$ is equivalent to $\frac{2}{8}$.

Using Fraction Strips

Another method of naming equivalent fractions is using fraction strips. You will find a set of fraction strips at the back of this Unit in your Workbook. Cut these out to create concrete models for solving the following.

Let's Explore

Exploration 2: Fraction Models

Materials: Unit 1, Lesson 5, Exploration 2 page from your Workbook, Fraction Strips, Paper, Pencil

1. Identify fractions equivalent to $\frac{1}{2}$ by comparing lengths of fraction strips.
2. Identify fractions equivalent to $\frac{1}{3}$ by comparing lengths of fraction strips.
3. Identify fractions equivalent to $\frac{3}{4}$ by comparing lengths of fraction strips.

Let's Practice

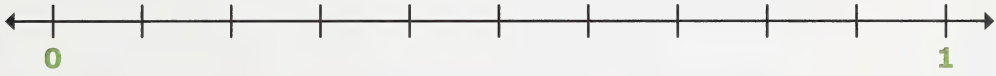
- In your Workbook go to Unit 1, Lesson 5 and complete 14 to 18.

Comparing Fractions with Like Denominators

Remember when you learned about mathematical symbols?

Some of the ones you probably know are: + - x ÷ =

These are all mathematical symbols. Remember the symbols to show less than and greater than? These symbols are called **inequalities** and they show that the relationship between numbers that are not equal.



The arrow at the beginning of a number line where the numbers are the smallest is the symbol for **less than.**

The arrow at the end of a number line where the larger numbers are is the symbol used for **greater than**.

Symbol	Meaning
<	Less Than
>	Greater Than

A math sentence is read just like a sentence, from left to right. The sentence "two is less than twenty-five" can be written as the math sentence "2 < 25".

Given two numbers to compare, start at the left and determine if that number is greater or less than the second number. Then insert the correct symbol.

You need to be able to compare fractions by size. One way to do this is using the symbols: <, > or =.

Example 3

Compare the following fractions. Complete with <, >, or =: $\frac{3}{6}$ _____ $\frac{5}{6}$

Think of the part of a group for this one.

If you have 3 out of 6 pieces of a pizza and your friend has 5 out of 6 pieces of a pizza that is the same size, who has the most? The pictorial model below shows the problem:

Three out of six or $\frac{3}{6}$

Five out of six or $\frac{5}{6}$

The pizzas are both divided into six pieces. This means that each portion, or slice, of the pizzas is equivalent. Since each piece is the same, you can compare the number of pieces: 3 and 5.

3 is less than 5 so $\frac{3}{6}$ is less than $\frac{5}{6}$.

Another way you can compare is by looking at the area of the shaded region in our picture above. You can tell by looking at the shaded area that $\frac{3}{6}$ is a smaller area of the circle than $\frac{5}{6}$.

$\frac{3}{6} < \frac{5}{6}$

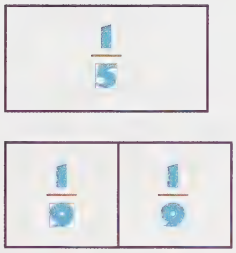
Comparing Fractions with Unlike Denominators

Not all fractions you need to compare have the same denominator. The method to compare these fractions is more challenging.

Example 4

Compare the following fractions. Complete with <, >, or =: $\frac{2}{9}$ _____ $\frac{1}{5}$

Using fraction strips, compare the length of $\frac{2}{9}$ and $\frac{1}{5}$:



Using the fractions strips you can see that $\frac{2}{9}$ is slightly longer than $\frac{1}{5}$.

This means that the value of $\frac{2}{9}$ is greater than $\frac{1}{5}$.

$$\frac{2}{9} > \frac{1}{5}$$

- In your Workbook go to Unit 1, Lesson 5 and complete 19 to 27.

Ordering Fractions

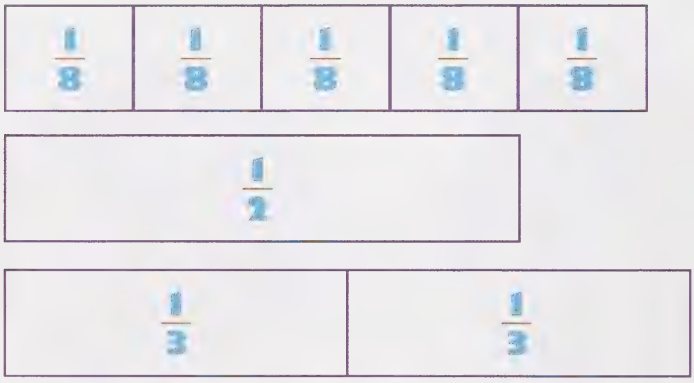
Another way to compare fractions is to put them in order from least to greatest.

Example 5

Order the fractions from least to greatest using Fraction Strips.

$\frac{5}{8}, \frac{1}{2}, \frac{2}{3}$

Represent each fraction with a model, using Fraction Strips.



Compare the lengths and order the numbers.

You can see that $\frac{1}{2}$ is the shortest and $\frac{2}{3}$ is the longest of the three.

From least to greatest: $\frac{1}{2}, \frac{5}{8}, \frac{2}{3}$

You could also use a pictorial representation for a problem like this. Remember, you used circles divided into parts earlier. You could also use squares or rectangles:

You should find the models that work best for you! If you do not have access to fraction strips you can draw pictures to help you compare parts of the whole.

Exploration 3: Comparing Fractions

Materials: Unit 1, Lesson 5, Exploration 3 page from your Workbook, Paper, Pencil crayons

For 1 - 5: Alyssa has 5 blue marbles, Daksha has 9 red marbles, and Nina has 4 yellow marbles.

1. Draw a picture of the problem using your pencil crayons.
2. What part of the marbles are red?
3. What part of the marbles are blue?

4. What part of the marbles are yellow?

5. Write the fraction of the marbles that each kid has, in order from least to greatest.

For 6 - 8: Cameron colours $\frac{1}{2}$ of the rectangle green. Lian colours $\frac{1}{4}$ of the rectangle purple. Zach colours $\frac{3}{8}$ of the rectangle orange.

6. Colour the parts of the rectangle as described.

7. Who has the largest part of the rectangle shaded?

8. Write the fractions in order from least to greatest.

Let's Practice

- In your Workbook go to Unit 1, Lesson 5 and complete 28 to 31.

Lesson 6

Parts of a Whole - Decimals

Canada Geese

Canada Geese can be identified by their long black neck, black head, crown and bill. The back and feathers on top of their wings are shades of brown. The throat, cheeks, and under-tail of the bird are white. These white marks make it easy to identify them.

Canada geese travel in large groups and fly in a V-shaped formation. They may migrate in the winter to parts of the United States.

They are a rather large bird. They range from 0.508 to 1.270 metres in length. They can have a wingspan of 1.270 to 1.272 metres.

Reflection

How do you say 0.508? What fraction of a metre is 0.508?

Objectives for this Lesson

In this lesson you will explore the following concepts:

- Describe and represent decimals concretely, pictorially and symbolically
- Relate decimals to fractions

Go online to complete the Concept Capsule: Understanding Decimals Using Base 10 Blocks.

Parts of a Whole

Remember that one way to show a picture of a decimal is to use base ten blocks. Since those are hard to put on paper they may be represented with these pictures:

Three Tenths or 0.3

The square has 10 parts.
3 parts are shaded.
The 3 goes in the tenths place.

Ones		Tenths	Hundredths	Thousandths
0	•	3		

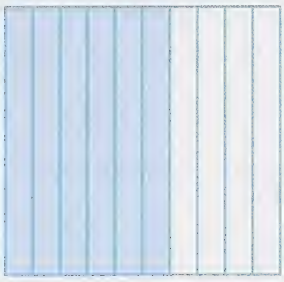
Three Hundredths or 0.03

The square has 100 parts.
3 parts are shaded.
The 3 goes in the hundredths place.

Ones	.	Tenths	Hundredths	Thousandths
0	•	0	3	

Now It's Your Turn

Write the decimal to match the shaded part of each picture.

a. 

b.

c.

Solutions

a. 0.6

b. 0.64

c. 0.46

Relate Fractions to Decimals

Fractions and decimals both relate parts to a whole. Decimals always have a whole that is cut into 10, 100, 1 000, and so on.

Fractions may have any number of parts.

$\frac{1}{2}$ $\frac{3}{10}$ $\frac{5}{8}$ $\frac{9}{100}$

When you look at models of fractions you can see that they may also represent decimals.

For the following, notice the decimal and the fraction:

Picture	Parts of Whole	Decimal	Fraction
	There are 76 shaded parts of the whole that is divided into 100 pieces.	0.76	$\frac{76}{100}$

The number of shaded parts follows the decimal place. The last digit is in the hundredths place because there are 100 parts to the whole. If there were 10 parts then the last place would fall in the tenths place.

For the fraction, the numerator is the number of shaded parts. The denominator is 100 because there are 100 parts to the whole.

Example 1

For the picture shown, answer the following questions:

A. What decimal amount is shaded?

B. What fractional amount is shaded?

A. How many parts are in the whole? Remember, this will tell you the place value of your decimal.

There are 10 parts. The decimal will have a tenths place: 0.___

How many parts are shaded? This will be the number in the tenths place.

4 parts are shaded.

The decimal amount shaded is: 0.4

B. How many parts are in the whole? Remember, this will tell you the number in the denominator.

There are 10 parts. The fraction will have a 10 in the denominator: $\frac{\square}{10}$

How many parts are shaded? This will be the number in the numerator.

4 parts are shaded.

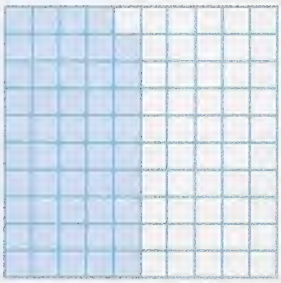
The fraction will be: $\frac{\boxed{4}}{10}$

Example 2

For the picture shown, answer the following questions:

A. What decimal amount is shaded?

B. What fractional amount is shaded?



A. How many parts are in the whole? Remember, this will tell you the place value of your decimal.

There are 100 parts. The decimal will have a hundredths place: 0. ___ ___

How many parts are shaded? This will be the number in the tenths place.

49 parts are shaded.

The decimal will be: 0.49

B. How many parts are in the whole? Remember, this will tell you the number in the denominator.

There are 100 parts. The fraction will have a 100 in the denominator: $\frac{\square}{100}$

How many parts are shaded? This will be the number in the numerator.

49 parts are shaded.

The fraction will be: $\frac{\boxed{49}}{100}$

Let's Explore

Exploration 1: Fraction – Decimal Patterns

Materials: Unit 1, Lesson 6, Exploration 1 page from your Workbook, Pencil

Notice the pattern to the table of equivalent fractions and decimals:

Fraction	$\frac{3}{10}$	$\frac{6}{10}$	$\frac{7}{10}$	$\frac{9}{10}$	$\frac{4}{100}$	$\frac{23}{100}$	$\frac{30}{100}$	$\frac{68}{100}$
Decimal	0.3	0.6	0.7	0.9	0.04	0.23	0.30	0.68

1. What do you notice about the decimals when the denominator is 10?
2. What do you notice about the decimals when the fraction's denominator is 100?
3. Reflect: What is the relationship between the denominator of the fraction and the place value of the decimal?
4. Apply this knowledge: Complete the table.

Fraction	$\frac{2}{10}$		$\frac{8}{10}$		$\frac{21}{100}$	$\frac{39}{100}$		
Decimal		0.5		0.12			0.57	0.84

Now It's Your Turn

Write each decimal as a fraction.

a. 0.2

b. 0.5

c. 0.23

d. 0.06

Solutions

a. $\frac{2}{10}$

b. $\frac{5}{10}$

c. $\frac{23}{100}$

d. $\frac{6}{100}$

- In your Workbook go to Unit 1, Lesson 6 and complete 1 to 6.

Thousandths

Think about this pattern: $0.1 = \frac{1}{10}$, $0.01 = \frac{1}{100}$

Notice that the number of zeros in the denominator of the fraction is equal to the number of decimal places in the decimal.

What decimal value would equal $\frac{1}{1\,000}$? Based on the pattern you observed, your answer should be 0.001.

Example 3

The cactus pygmy-owl is about $\frac{168}{1\,000}$ of a metre long. Write the fraction as a decimal.

You would read the fraction like this: "one hundred sixty eight thousandths"
The denominator tells you that the 8 goes in the thousandths place.
You will put the 1 and 6 in the spaces before the 8.

Ones	.	Tenths	Hundredths	Thousandths
0	•	1	6	8

$\frac{168}{1\,000} = 0.168$

Example 4

Write $\frac{5}{1000}$ as a decimal.

You would read the fraction like this: "five one thousandths"
The denominator tells you that the 5 will be in the thousandths place.
You need to fill in the other places after the decimal with a 0.

Ones	.	Tenths	Hundredths	Thousandths
0	•	0	0	5

$\frac{5}{1000} = 0.005$

Example 5

Write $\frac{14}{1000}$ as a decimal.

There are two digits in the numerator. The 4 must be placed in the thousandths place so the 1 will be in the hundredths and a 0 in the tenths. You must think backwards to get this one; the last digit has to be in the thousandths place.

Ones	.	Tenths	Hundredths	Thousandths
0	•	0	1	4

$\frac{14}{1000} = 0.014$

Now It's Your Turn

Write each fraction as a decimal.

a. $\frac{3}{10}$

b. $\frac{17}{100}$

c. $\frac{9}{1000}$

d. $\frac{32}{1000}$

Solutions

a. 0.3

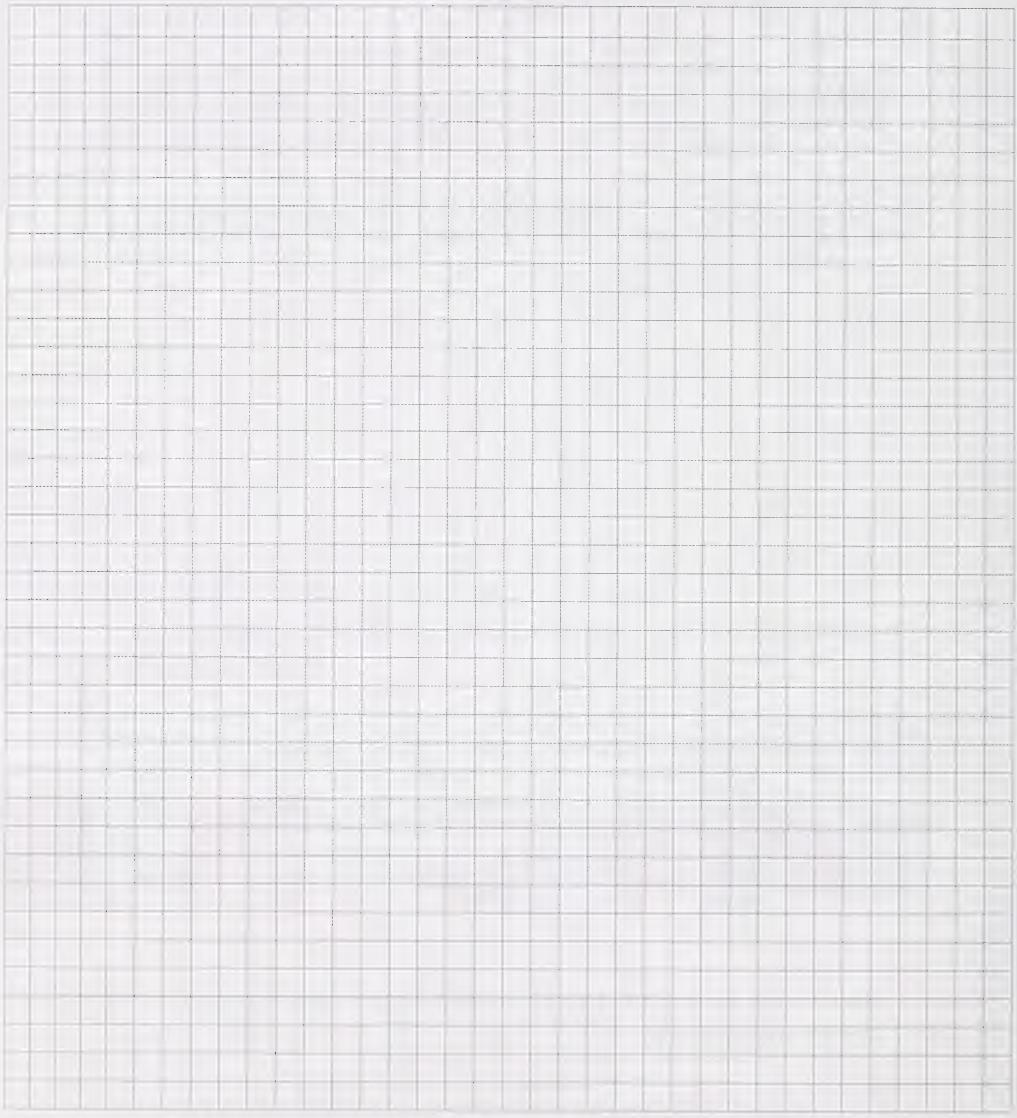
b. 0.17

c. 0.009

d. 0.032

Go online to watch the Notepad Tutor: Relating Decimals to Fractions (to thousandths).

- In your Workbook go to Unit 1, Lesson 5 and complete 7 to 20.



Lesson 7

Place Value - Decimals

Parts of a Dollar

The first coins that were valued at less than a dollar in Canada were issued in 1858. Canadian coins were originally made of bronze and silver. They are now made up of a mixture of steel, copper, and nickel. One-dollar and two-dollar coins are still made of bronze and copper.

94%	Steel
1.5%	Nickel
4.5%	Copper Plating

There are four coins that are used to make part of a dollar. They are the penny, nickel, dime, quarter, and half-dollar. You can use any combination of these coins to make a dollar. Here are a few:

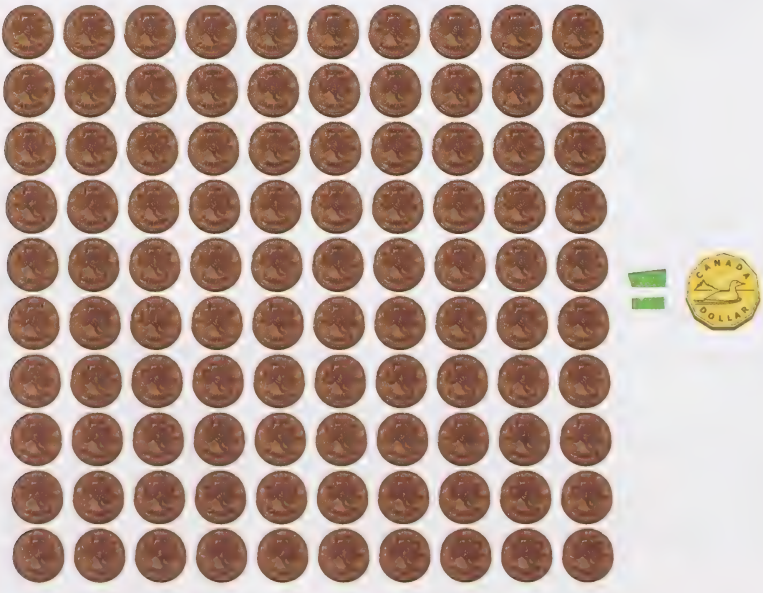
- 4 quarters
- 2 quarters, 5 dimes
- 2 quarters, 3 dimes, 4 nickels
- 2 quarters, 3 dimes, 3 nickels, 5 pennies

Nina has a quarter, a dime, a nickel, and a penny.

Each coin represents a part of a dollar.

The dime represents 0.1 or one-tenth of a dollar.
In dollar form that is $0.10.

The penny represents 0.01 or one-hundredth of a dollar.
In dollar form that is $0.01.



Reflection

Why do you need to add a 0 to the end of 0.1 to write the value of a dime? Why don't you add a 0 to the end to write the value of a penny?

Objectives for this Lesson

In this lesson you will explore the following concepts:

- Recognize and write equivalent decimals
- Compare decimals to thousandths
- Order decimals to thousandths

Equivalent Decimals

Equivalent decimals are decimals that name the same amount.

One way to see equivalent decimals is using models.

0.6

0.60

The second model is simply the first model with horizontal lines to make 100 parts. The shaded part is the same.

You can see that the decimals modeled each have a six in the tenths place. The second decimal has a 0 in the hundredths place to show that it is part of 100.

Could you write this equivalent decimal in one more way?

You could write it as 0.600 or 600 thousandths.

Reflection

Is there really a limit to how many zeros you can add to the end after a decimal?

Look at each decimal in the place value chart:

Ones	•	Tenths	Hundredths	Thousandths
0	•	6		
0	•	6	0	
0	•	6	0	0

Using the chart you can see that they all have the same value in each place. Some are using 0 to represent that value after the 6 and some are not.

Now It's Your Turn

Are the two decimals equivalent? Use a place value chart to figure it out. Then write equivalent or not equivalent.

a. 0.340
0.034

b. 0.020
0.02

c. 0.05
0.050

d. 0.51
0.051

Solutions

a. Not equivalent b. Equivalent c. Equivalent d. Not equivalent

Writing Equivalent Decimals

Now that you can recognize equivalent decimals, you should be able to write them. Look at the following example:

Example 1

Write two decimals that are equivalent to 0.04.

Here are two possible solutions.

You could simply add 0 to the end of the 4:

0.040

You could add two 0s after the 4:

0.0400

Now It's Your Turn

Write two decimals that are equivalent to each of the following decimals.

a. 0.2

b. 0.08

c. 0.44

d. 0.50

Solutions

a. 0.20, 0.200

b. 0.080, 0.0800

c. 0.440, 0.4400

d. 0.5, 0.500

Let's Practice

- In your Workbook go to Unit 1, Lesson 7 and complete 1 to 8.

Comparing Decimals

You can compare numbers using the symbols <, >, or =. Some ways to compare decimals are using Base 10 Blocks, grid paper or by using a Place Value Chart.

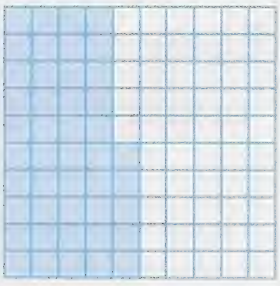
Let's explore! Use **Hundred Squares** to shade the values in the following examples. You will find a page of hundred squares at the end of this Unit in your Workbook.

Example 2

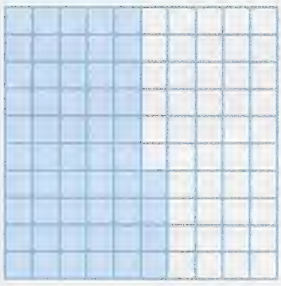
Compare using <, >, or =: 0.45 ____ 0.54

Using Hundred Squares you can compare these decimals with a picture:

0.45



0.54



The picture shows you that 0.45 has less area shaded.

Therefore 0.45 is less than 0.54.

0.45 < 0.54

Example 3

Compare using <, >, or =: 0.05 ____ 0.045

Using a place value chart you can determine that the value in the tens is higher for 0.05 than 0.045. You read these from left to right.
Stop comparing when you reach a column where one is greater than the other.

Ones	•	Tenths	Hundredths	Thousandths
0	•	0	5	
0	•	0	4	5

Since 5 is greater than 4, 0.05 is greater than 0.045

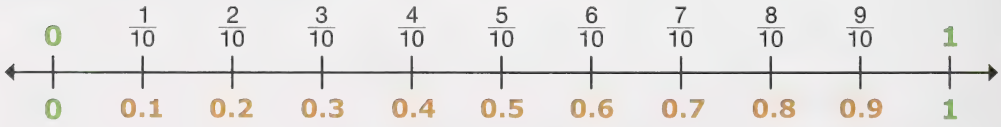
$0.05 > 0.045$

Let's Practice

- In your Workbook go to Unit 1, Lesson 7 and complete 9 to 20.

Ordering Decimals

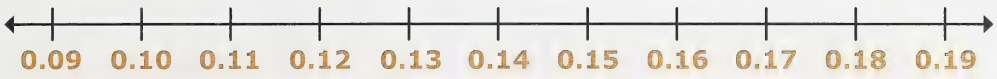
You can use a number line to order the values of decimals.



Notice that you can tell that 0.5 is smaller than 0.8 because it falls to the left of 0.8. If you were asked to order these numbers from least to greatest, the answer would be 0.5, 0.8.

Example 4

Use a number line to write the following in order from least to greatest: 0.13, 0.09, 0.15.



Look for the order of the numbers on the number line from left to right. You should find that 0.09 comes first, then 0.13 and finally 0.15.

The numbers from least to greatest: 0.09, 0.13, 0.15

Another way to order numbers is using the place value charts we used earlier.

Example 5

Use a place value chart to write the following in order from least to greatest: 0.03, 0.033, 0.003.

1. Put the numbers together in a place value chart:

Ones	•	Tenths	Hundredths	Thousandths
0	•	0	3	
0	•	0	3	3
0	•	0	0	3

2. The smallest number will be 0.003 because it is the first number to have a 0 in the hundredths (they all have 0 in the tenths).

3. 0.03 and 0.33 have equal hundredths, so compare thousandths. 0.03 is smaller since it has no value (or 0) in the thousandths.

Let's Explore

Exploration 1: Comparing and Ordering Numbers

Materials: Unit 1, Lesson 7, Exploration 1 page from your Workbook, Pencil

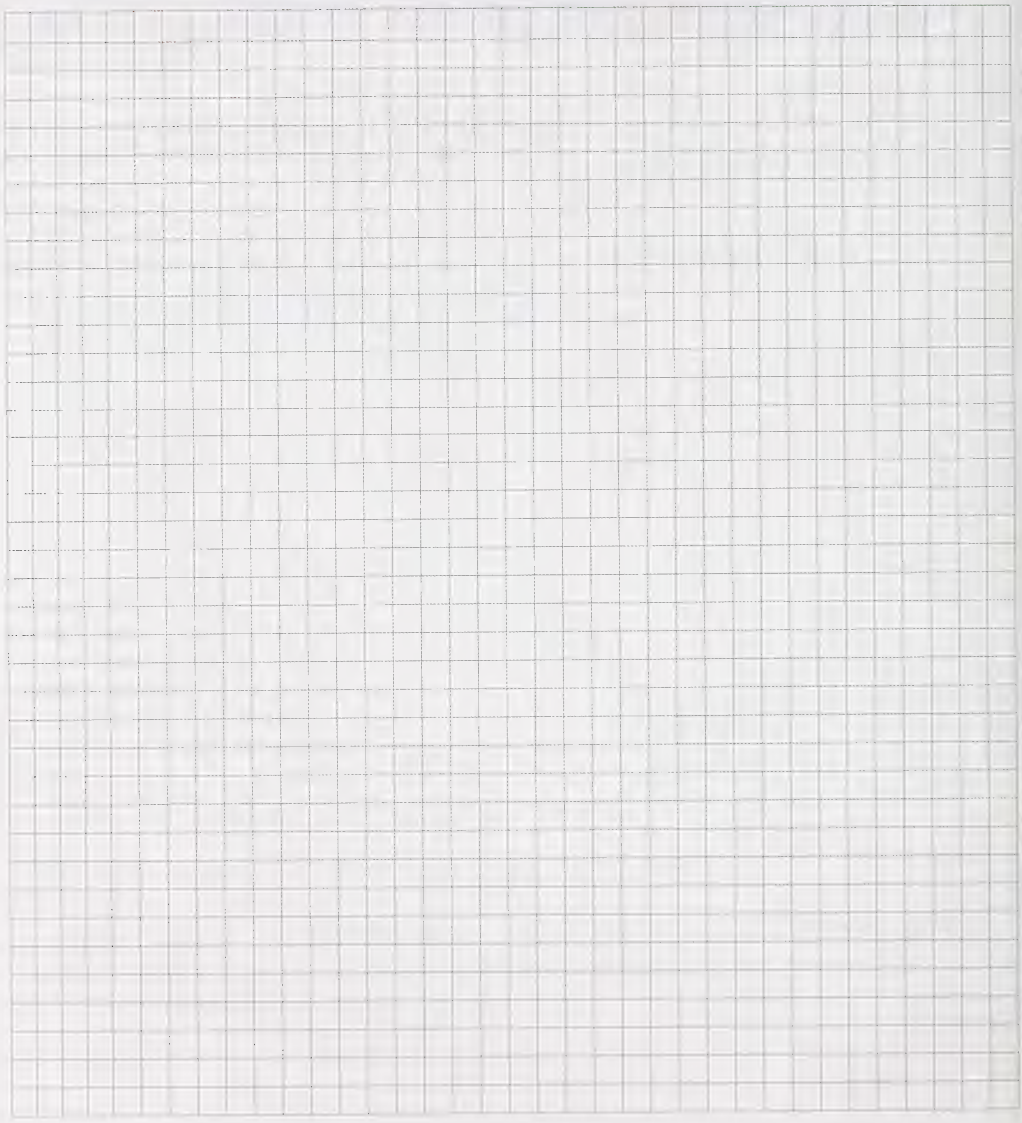
Animal	Rate (Km/Hr)
Elk	72.420
Cheetah	112.654
Lion	80.467
Ostrich	64.374
Rabbit	56.327

1. Which animal can run the fastest?
2. Which animal is the slowest?
3. Name one animal that is slower than the lion.
4. Name one animal that is faster than the elk.
5. Write the animals in order from slowest to fastest.
6. Research: Use the Internet or an encyclopaedia to find the speed of 4 more animals. Record the speed of each animal and list the animals from slowest to fastest.

Let's Practice

Go online to complete the Concept Capsule: Ordering Decimals Using Base 10 Blocks.

- In your Workbook go to Unit 1, Lesson 7 and complete 21 to 26.



Lesson 8

Adding Decimals

Rainfall in Calgary

Researching and learning about a certain city or area can be very interesting. You can learn about its history, interesting places to visit and also about its weather. If you look in an atlas about Calgary you can find the data collected about temperature, snowfall and rainfall amounts. You can also find many other measurements.

The table shows the average rainfall amounts in Calgary. Study the following table:

Month	Rainfall Amount
January	1.27 cm
February	1.016 cm
March	1.524 cm
April	2.54 cm
May	5.33 cm
June	7.62 cm
July	7.112 cm
August	4.826 cm
September	4.826 cm
October	1.524 cm
November	1.27 cm
December	1.27 cm

Which month(s) has the most rain? If you said July you are correct. Which month(s) have the least rain? If you said February you are correct again! How can you find out how much total rain Calgary gets in one year? If you add all 12 months together you will have the answer.

1.27 + 1.016 + 1.524 + 2.54 + 5.33 + 7.62 + 7.112 + 4.826 + 4.826 + 1.524 + 1.27 + 1.27 = 40.128 cm

Reflection

After studying the information in the table, in your opinion when would be the best time to begin growing a garden?

Objectives for this Lesson

In this lesson you will explore the following concepts:

- Add decimals to thousandths

Go online to watch the Notepad Tutor: Adding Decimals (to hundredths).

Adding Decimals

Remember that you add decimals the same way that you add whole numbers. You will need to make sure that the place value of each number is lined up in the correct place before adding each column. You always use the decimal as a guide.

Tens	Ones	.	Tenths	Hundredths
1	2	.	0	4
	5	.	2	5
1	7	.	2	9

Here you see a sample of 12.04 + 5.25. The place values are lined up and then added.

If you are asked to add, and each number has a different number of places, simply line up the decimals and fill in the holes with 0:

Ones	.	Tenths	Hundredths	Thousandths
2	.	3	4	
4	.	7	6	2

2.34 + 4.762

For addition:

$$\begin{array}{r} {\scriptstyle 1\ 1\ \ \ } \\ 2.340 \\ +\ 4.762 \\ \hline 7.102 \end{array}$$

As you can see, as long as the decimals are lined up, you will add the proper place values.

Example 1

Write a number sentence for the following problem. Solve.

Lisa has 2 pieces of fabric measuring 2.451 m and 3.237 m. How many metres of fabric does she have?

Write a number sentence for the problem:

2.451 + 3.237

Use the decimals to line up the place values:

Ones	.	Tenths	Hundredths	Thousandths
2	.	4	5	1
3	.	2	3	7

The place value chart becomes:

$$\begin{array}{r} 2.451 \\ +\ 3.237 \\ \hline \end{array}$$

Add the columns from right to left, starting with the **thousandths** place.

$$\begin{array}{r} 2.451 \\ +\ 3.237 \\ \hline 5.688 \end{array}$$

Be sure to bring down the decimal in the appropriate position.
Lisa has 5.688 metres of fabric.

This is just like basic addition but there will be times when you will need to **regroup**. When you need to regroup you can use place value instead of traditional form to help you solve the problem. Using visual models is one way to understand this.

Pictorial Models

You can also use picture models to understand addition of decimals.

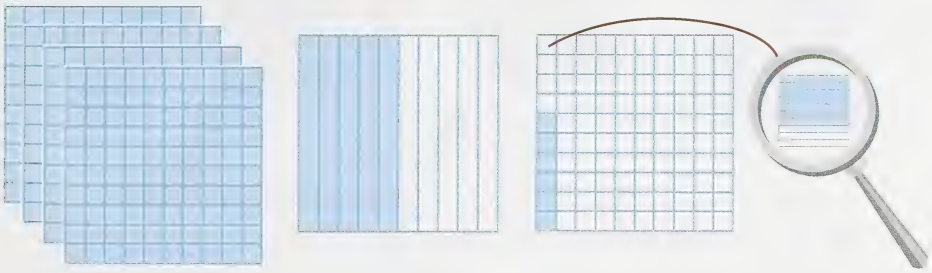
By taking one hundredth and dividing it into ten equal pieces you can create thousandths:

This creates one thousand pieces of the whole since 100 x 10 = 1 000.

Example 2

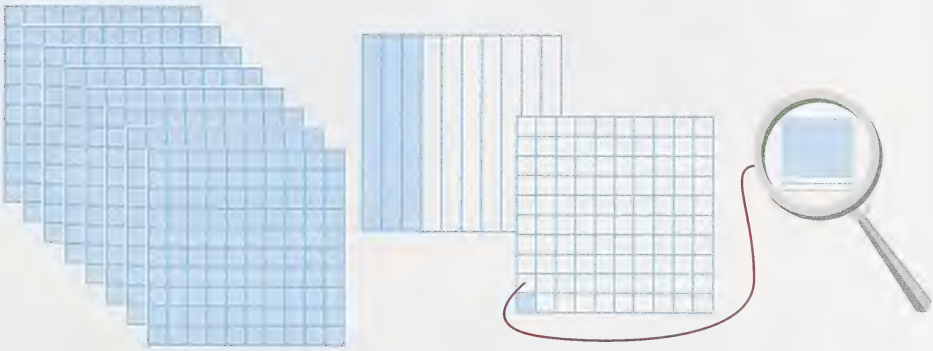
Add 4.567 + 8.318

1. Model 4.567. You can use Hundred Squares in the back of your Workbook.



4 ones **5 tenths** **6 hundredths** **7 thousandths**

2. Model 8.318



8 ones **3 tenths** **1 hundredth** **8 thousandths**

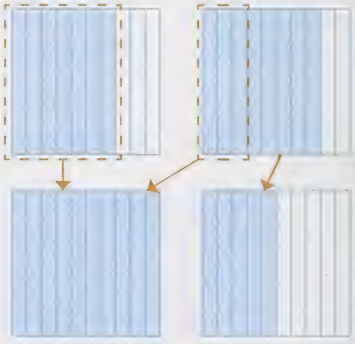
3. Add. Start with the thousandths:

You will need to regroup: Seven thousandths + eight thousandths

Create 10 thousandths by adding 3 thousandths from the second to the first:

This gives us 1 hundredth and 5 thousandths.

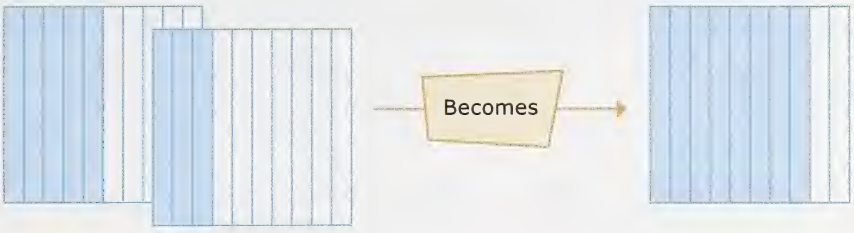
The thousands will stay and the 1 hundredth will be added next.



4. Add the hundredths. You are bringing one hundredth and five thousandths from number 3:

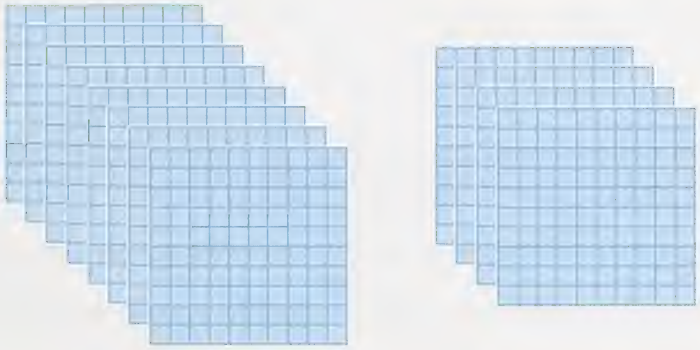
6 hundredths, 1 hundredth and 1 hundredth = 8 hundredths

5. Add the tenths. You are bringing no tenths from number 4.



5 tenths plus 3 tenths = 8 tenths

6. Now add all the ones:



8 ones plus 4 ones = 12

4.567 + 8.318 = 12.885

Another way to look at adding decimals is with expanded notation. Look at the following example to understand further.

Example 3

Add using expanded notation.

6.278 + 1.943

1. Look at the place value of each number:

Ones	.	Tenths	Hundredths	Thousandths
6	.	2	7	8
1	.	9	4	3

2. Write each number in expanded notation

6 + .2 + .07 + .008 and 1 + .9 + .04 + .003

3. Line up the values according to place value and add from left to right:

$$\begin{array}{r} 6 + .2 + .07 + .008 \\ +\ 1 + .9 + .04 + .003 \\ \hline 7 + 1.1 + .11 + .011 \end{array}$$

Sometimes this type of regrouping may feel strange at first. If you learn better through listening, say the following out loud:

a. eight thousandths plus three thousandths equals eleven thousandths

b. seven hundredths plus four hundredths equals eleven hundredths

c. two tenths plus nine tenths equals eleven tenths

d. six ones plus one one equals seven ones

4. Add all four numbers together:

7 + 1.1 + .11 + .011

7 + 1.1 + .11 + .011 = 8.221

The traditional method for adding decimals is the same one that you used with adding large numbers. You regroup by carrying the place value to the top of the problem.

Example 4

Add 3.528 + 6.389

1. Line up the decimals for addition:

$$\begin{array}{r} 3.528 \\ +\ 6.389 \\ \hline \end{array}$$

2. Add the thousandths place first. 8 + 9 = 17 so you will need to carry the 1:

$$\begin{array}{r} {\scriptstyle 1} \\ 3.528 \\ +\ 6.389 \\ \hline 7 \end{array}$$

3. Now add the hundredths place. The 1 that you carried is part of it now so you will add 1 + 2 + 8. Again, you will have to carry since the sum is 11:

$$\begin{array}{r} {\scriptstyle 1\ 1} \\ 3.528 \\ +\ 6.389 \\ \hline 17 \end{array}$$

4. Add the tenths place. You will not need to carry since it is 1 + 5 + 3 = 9. This is a good time to bring down the decimal:

$$\begin{array}{r} {\scriptstyle 1\ 1} \\ 3.528 \\ +\ 6.389 \\ \hline .917 \end{array}$$

5. Add the ones place.

$$\begin{array}{r} {\scriptstyle 1\ 1} \\ 3.528 \\ +\ 6.389 \\ \hline 9.917 \end{array}$$

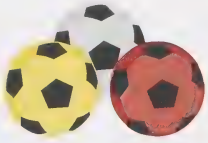
Let's Explore

Exploration 1: Let's Go Shopping!

Materials: Unit 1, Lesson 8, Exploration 1 page from your Workbook, Pencil

Your mom has given you $10.00 to spend at the store. You can buy anything that you want as long as it costs less than $10.00. The items that you like are shown below:

Yo-yo: $3.95



Balls: $4.25

Book: $2.50

Pretzel: $1.25

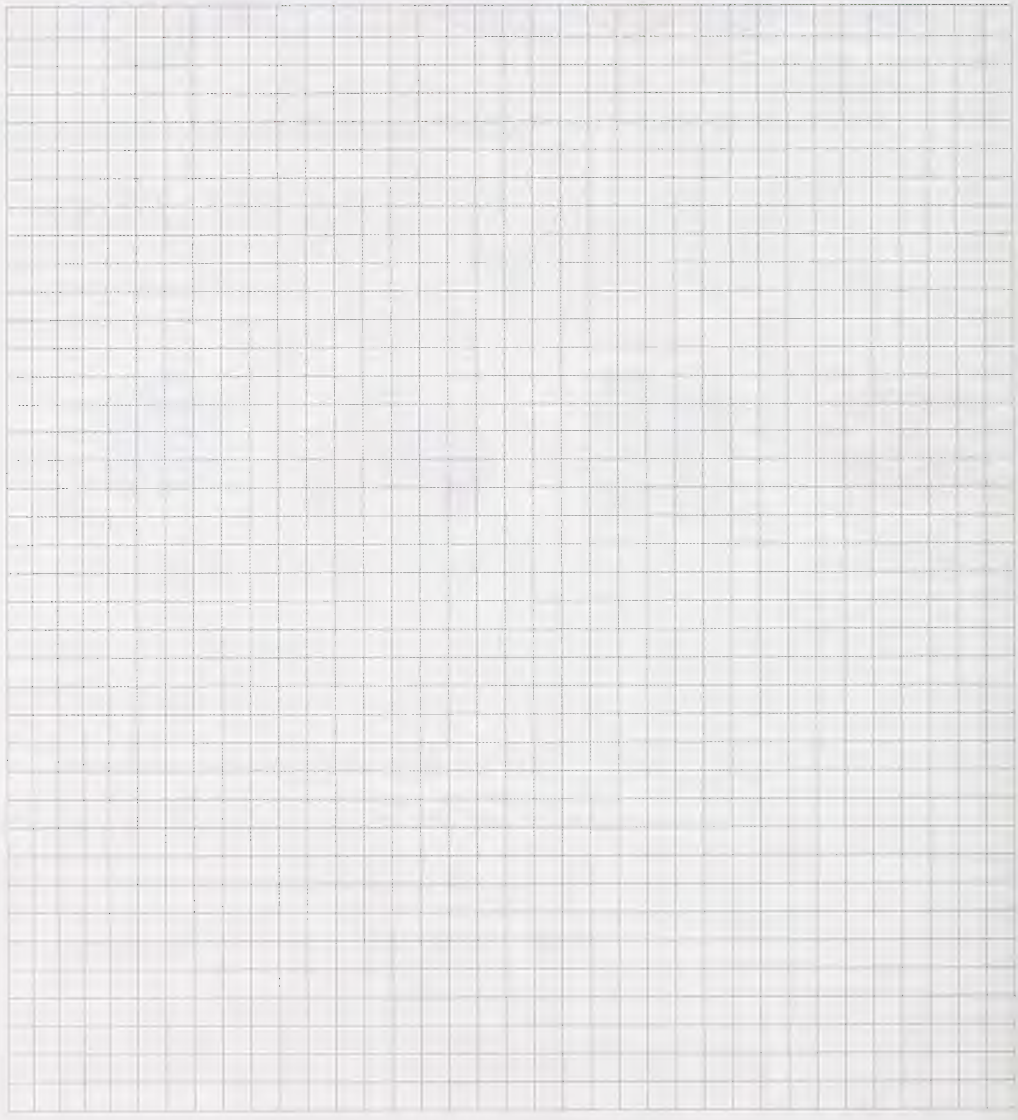
Answer the following questions. Show your work.

1. What combinations of items can you buy for $10.00?
2. How many yo-yos can you buy for $10.00?
3. How many sets of balls can you buy for $10.00?
4. How many books can you buy for $10.00?
5. How many pretzels can you buy for $10.00?

Let's Practice

Go online to watch the Notepad Tutor: More on Adding Decimals.

- In your Workbook go to Unit 1, Lesson 8 and complete 1 to 21.



Lesson 9

Subtracting Decimals

Balancing a Cheque Book or Savings Account

Money, money, money! It seems to be a part of everything that you do. For that very reason it is very important to know how to manage your finances. When you are earning money you need a safe place to keep it. Usually people open a chequing or savings account. A bank teller is one example of a person that takes care of a business's or an individual's bank accounts. When you have money that you would like to deposit, or put money into a bank account, you take it to the bank and a teller will help you. If you need to get money out of your account he or she can help you do that also.

Look at the following example of a cheque register:

RECORD ALL CHARGES OR CREDITS THAT AFFECT YOUR ACCOUNT

CHEQUE NUMBER	DATE	DESCRIPTION OF TRANSACTION	PAYMENT/DEBIT {-}		✓	FEE {-}	DEPOSIT/CREDIT {+}		BALANCE $	

This is where you write down all of the cheques that you write and the deposits that you make. When you write in the information you can add or subtract the amount and know exactly how much money that you have in your account. The following chart is an example of someone's cheque register.

CHEQUE	DATE	CHEQUE PAID TO	PAYMENT	DEPOSIT	BALANCE
					$1 350 00
29	1-Jun	Sports Magic Store	$55 27		$1 294 73
30	3-Jun	Grocery Store	$27 42		$1 267 31
	10-Jun	Deposit		$167 29	$1 434 60

Reflection

How did the payment to the sports store change the balance? What must you do to find a balance after making a payment?

Objectives for this Lesson

In this lesson you will explore the following concept:

- Subtract decimals to the thousandths

Go online to watch the Notepad Tutor: Subtracting Decimals with No Place Holder.

Subtracting Decimals

You should remember that subtracting decimals is just like subtracting whole numbers. You will need to make sure to line up the numbers by place value, using the decimal as your guide.

Example 1

Subtract 6.359 – 3.218

1. Line up the decimals and subtract:

$$\begin{array}{r} 6.359 \\ -\ 3.218 \\ \hline \end{array}$$

2. Subtract starting with the thousandths place from right to left:

$$\begin{array}{r} 6.359 \\ -\ 3.218 \\ \hline 3.141 \end{array}$$

This may seem really simple, but remember that there will be times when you will need to borrow to complete the problem.

One way to understand **borrowing** is to use your place value charts. Here is an example of borrowing with place value charts.

Example 2

Subtract 6.724 – 3.437

1. Create a place value chart with the first number in row 1 and the second number in row 2:

Ones	•	Tenths	Hundredths	Thousandths
6	•	7	2	4
3	•	4	3	7

2. To subtract the thousandths place you need to borrow 1 from the hundredths place. This will make the value in the thousandths place 14.

Ones	•	Tenths	Hundredths	Thousandths
6	•	7	~~2~~ 1	14
3	•	4	3	7
				7

3. To subtract the hundredths place, borrow 1 from the tenths place. This will make the value in the hundredths place 11.

Ones	•	Tenths	Hundredths	Thousandths
6	•	~~7~~ 6	~~2~~ 11	14
3	•	4	3	7
			8	7

4. Now subtract the tenths and the ones. Don't forget the decimal.

Ones	•	Tenths	Hundredths	Thousandths
6	•	~~7~~ 6	~~2~~ 11	14
3	•	4	3	7
3	•	2	8	7

The traditional method is to line up the place values without a chart and subtract by borrowing in the same fashion. The difference is that you place the borrowed numbers above their place.

Example 3

Subtract 5.237 – 2.029. Check using addition.

1. Line up the decimals:

```
  5.237
- 2.029
```

2. Borrow from the hundredths to subtract the thousandths:

```
  5.2 2 1
  ~~3~~ 7
- 2.029
      8
```

3. Finish subtracting by place values:

```
  5.2 2 1
  ~~3~~ 7
- 2.029
  3.208
```

4. Check by adding the answer and the number you subtracted:

```
  3.208
    1
+ 2.029
  5.237
```

Since the answer is the number you subtracted from, your answer is correct.

5.237 – 2.029 = 3.208

Let's Explore

Exploration 1: Keeping Track of Your $$$

Materials: Unit 1, Lesson 9, Exploration 1 page from your Workbook

You have your first job and have just opened up a savings account to keep your money. Fill in the following information in your Savings Booklet, finding the balance after each entry. A copy of a page from the Savings Booklet can be found on the Exploration page in your Workbook.

January 15	Deposit	$125.00
January 30	Deposit	$100.00
February 15	Deposit	$137.50
February 20	Withdrawal	$75.00
March 1	Deposit	$98.75
March 3	Withdrawal	$115.00
March 15	Deposit	$134.00
April 1	Deposit	$113.00
April 10	Withdrawal	$286.00

What is your ending balance?

Now It's Your Turn

Subtract.

a. 8.753 – 4.566

b. 10.982 – 3.411

c. 1.673 - 0.518

Solutions

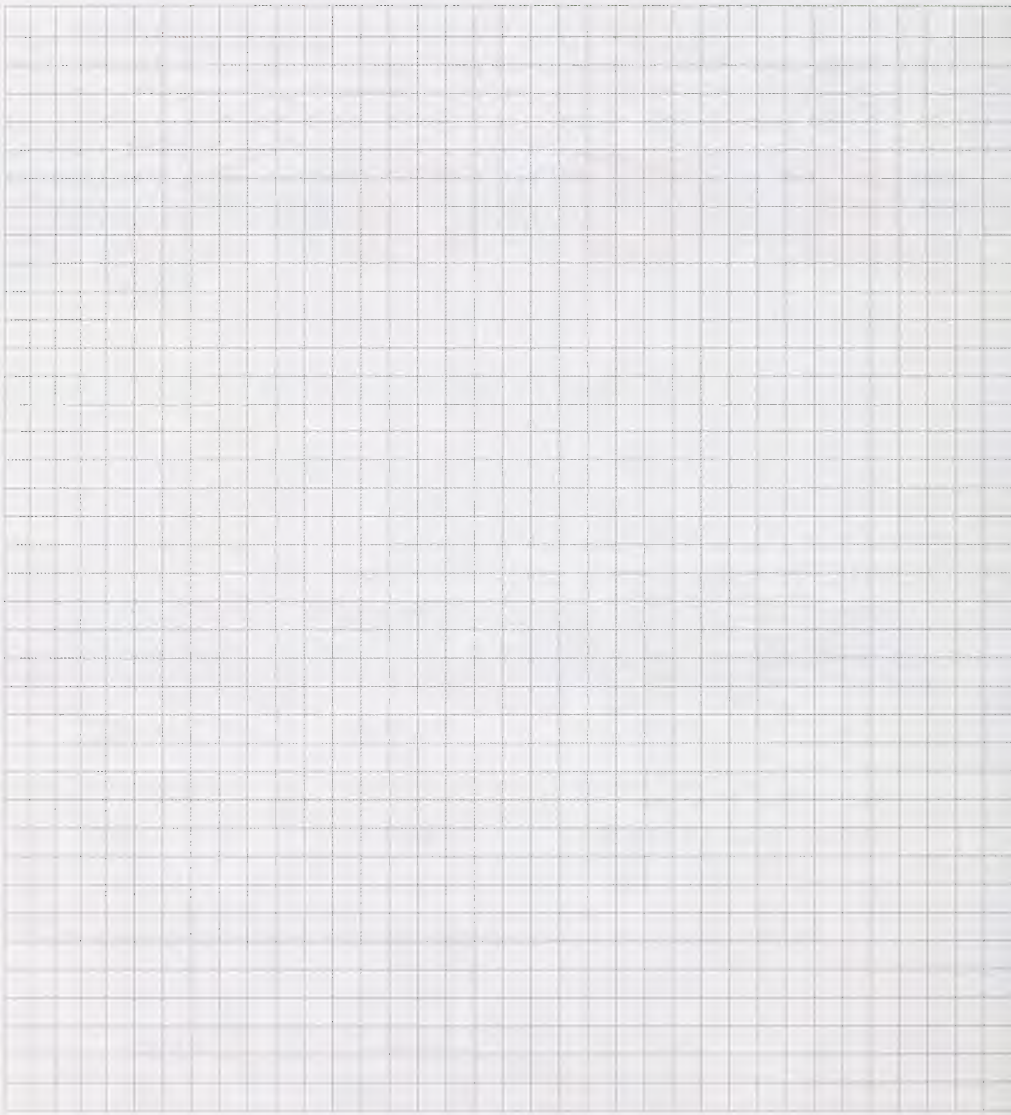
a. 4.187

b. 7.571

c. 1.155

Go online to complete the Concept Capsule: Subtracting Decimals Using Base 10 Blocks.

- In your Workbook go to Unit 1, Lesson 9 and complete 1 to 20.



Math 5 Unit 1

Lesson 10

Multiplication

Museums

In 1907 three brothers from a farm in central Alberta found a way to make history in Canada. They heard about the Wright Brothers creating the first flying machine so they decided to make their own. John Underwood was the first man in Canada to be lifted into the air by an aircraft.

The Alberta Aviation Museum has an exhibit that details the contributions of the Underwood brothers to the history of aviation in Alberta. These early pioneers and others can be studied there along with many aircraft.

The 5th grade class at Mountain Spring Elementary School is going on a field trip to the Alberta Aviation Museum. They have 58 students that will go on the trip. The admission for each student is $5.

To find the amount they will pay for the students to enter the museum you need to multiply 58 students by 5 dollars.

Reflection

How do you multiply a two-digit number by a one-digit number?

Objectives for this Lesson

In this lesson you will explore the following concepts:

- Multiply 2-digit by 2-digit numbers
- Solve 2-digit multiplication problems

Go online to complete the Concept Capsule: Understanding Distributive Property Using Base 10 Blocks.

Multiplying 3-Digit Numbers by 1-Digit Numbers

You should remember that multiplying three digits by a number from 1 through 9 may be done using many methods. Here is a quick review of a couple of those methods that may help you as we move on to more challenging problems.

Distributive Property

The distributive property makes multiplying large numbers a bit easier for you. It involves breaking down your two or three digit number into expanded notation based on place value. This helps you to keep the value of each place as it should be. The concept is the same for both examples. There are two different ways to organize your work.

Example 1

Multiply 234 x 8

Write 234 in expanded notation:

200 + 30 + 4

Multiply each term by 8:

(200 x 8) + (30 x 8) + (4 x 8)

1 600 + 240 + 32

Add each product:

1 872

Example 2

Multiply 315 x 6

Line up the ones digits to multiply:

```
   315
x    6
  ----
   30   6 x 5
   60   6 x 10
+1 800  6 x 300
  ----
  1 890
```

315 x 6 = 1 890

Notice that the second example uses the same concept as the first. The difference is how it is organized.

Multiplication by Carrying

Another way to multiply is by using an old method in which you carry over place values. You simply line up the place values of the numbers and multiply going down.

Example 3

Multiply 24 x 3

Remember, line up the ones and use basic facts.

First:

Multiply 3 x 4. Since the answer is 12 you will need to carry the 1 to above the tens digit.

$$\begin{array}{r} {\scriptstyle 1} \\ 24 \\ \times 3 \\ \hline 2 \end{array}$$

Next:

Multiply 3 times the 2 in the tens digit. You will get 6 but you must ADD the 1 that you carried.

$$\begin{array}{r} {\scriptstyle 1} \\ 24 \\ \times 3 \\ \hline 72 \end{array}$$

24 x 3 = 72

Now It's Your Turn

Multiply. Use estimation to check.

a. 24 x 5
b. 87 x 4
c. 124 x 6

Solutions

a. 120
b. 348
c. 744

Multiplying 2-Digits by 2-Digits

This goes way beyond multiplying by one digit. The distributive method using place value is a very important part of any multiplication problem.

Let's Explore

Exploration 1: Using Array Models

Materials: Unit 1, Lesson 10, Exploration 1 page from your Workbook, Pencil

The problem 18 x 12 can be modeled in this manner:

18 = 10 + 8 → 10 | 8 ; 12 = 10 + 2 ↓ 10

10 x 10	8 x 10	10
10 x 2	8 x 2	2

This models:

18 x 12 = (10 x 10) + (8 x 10) + (10 x 2) + (8 x 2)

Multiply the problem in each box:

10	8	
100	80	10
20	16	2

Add the numbers in each box to get the product:

100 + 80 + 20 + 16 = 216

18 x 12 = 216

For 1 – 3: Write the distributive property for the multiplication model.

1. _____ + _____ + _____ + _____

20 x 10	6 x 10
20 x 3	6 x 3

2. _____ + _____ + _____ + _____

30 x 20	5 x 20
30 x 4	5 x 4

3. _____ + _____ + _____ + _____

80 x 40	7 x 40
80 x 3	7 x 3

For 4 – 5: Model each product and find the answer.

4. 54 x 48 5. 74 x 32

6. Write your own multiplication problem of two digit numbers. Model the problem and find the answer.

Using the Distributive Property

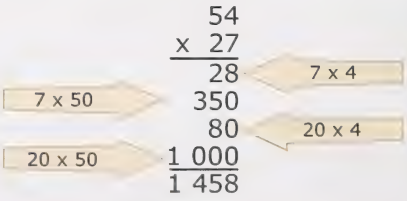
The distributive property can be used to multiply two digit numbers. Here is an example.

Example 4

Multiply 54 x 27 and check by estimation.

Another way of organizing:

1. Multiply the ones and write your answer down.
2. Multiply the ones from the bottom number to the tens of the top and write your answer down.
3. Multiply the tens from the bottom number to the ones of the top and write your answer down.
4. Multiply the tens and write your answer down.



Check: Estimate the solution using compatible numbers: 50 x 30 = 1 500.
Decide if your answer is reasonable by comparing it to the estimate.
54 x 27 = 1 458

You can also use the carrying method to multiply two digit numbers.

Example 5

Multiply 25 x 14

Line up the place values to begin:

$$\begin{array}{r} 25 \\ \times\ 14 \\ \hline \end{array}$$

Multiply the ones place of each number. In this case 4 x 5:

Carry the 2 from 5 x 4 = 20

$$\begin{array}{r} {\scriptstyle 2}\,25 \\ \times\ 14 \\ \hline 0 \end{array}$$

The 0 from 5 x 4 = 20 goes here

Multiply the ones of the second number by the tens of the first number. In this case 4 x 2:

After 4 x 2 = 8 ADD the 2 you carried

$$\begin{array}{r} {\scriptstyle 2}\,25 \\ \times\ 14 \\ \hline 100 \end{array}$$

Cross out the 2 once you have added it.

Multiply the tens of the second number by the ones of the first:

1 x 5 goes in front of place holder

$$\begin{array}{r} {\scriptstyle 2}\,25 \\ \times\ 14 \\ \hline 100 \\ 50 \\ \hline \end{array}$$

0 is a place holder

The place holder holds the ones place because here you are actually multiplying 10 x 5 since the value of the 1 in 14 is 10.

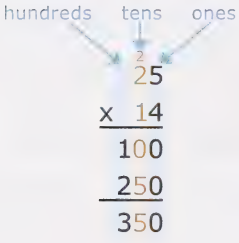
Multiply 1 times 2 – put in front of the 50:

$$\begin{array}{r} {\scriptstyle 2}\,25 \\ \times\ 14 \\ \hline 100 \\ 250 \\ \hline \end{array}$$

Add 100 + 250:

$$\begin{array}{r} {\scriptstyle 2}\,25 \\ \times\ 14 \\ \hline 100 \\ +\ 250 \\ \hline 350 \end{array}$$

This method all depends on keeping place values of each number in the same column. You could turn a piece of notebook paper sideways and use the columns rather than the lines to work your problem:



This will keep all of the place values lined up and help you organize your work.

Example 6

Multiply 86 x 42. Estimate to check your solution.

Line it up and multiply:

$$\begin{array}{r} {\scriptstyle 21}\,86 \\ \times\ 42 \\ \hline 172 \\ 3\,440 \\ \hline 3\,612 \end{array}$$

Check: If you estimate, the solution is 90 x 40 = 3 600 using compatible numbers. The answer is reasonable since it is so close to the estimate.
86 x 42 = 3 612

Another way to look at this method:

2 x 86 = 172 and 40 x 86 = 3 440.

These are the two numbers you get when you use the carrying method. You are really using distributive property: 86 x (40 + 2). So no matter what method you use it all goes back to that concept.

Practice these methods to determine which one works for you. The main thing is to be comfortable with the method you are using and to eliminate careless errors.

Now It's Your Turn

Multiply. Estimate to check the solution.

a. 35 x 12

b. 49 x 11

c. 67 x 12

Solution

a. 420

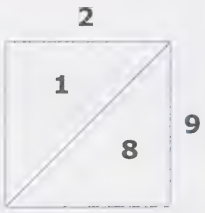
b. 539

c. 804

Lattice Multiplication

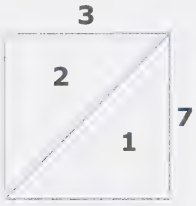
Another method for multiplying is called **lattice multiplication**. If you remember pictures better than words, you will like this method. Before you begin you need to practice writing answers to simple problems in a different form.

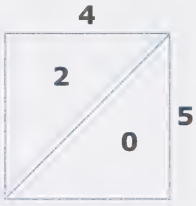
Write 2 x 9 = 18 in lattice form:

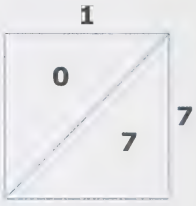


Notice that the 2 and the 9 are outside the box. The 1 for the tens place is in the top part of the divided box. The 8 for the ones is in the bottom.

3 x 7 = 21 4 x 5 = 20 1 x 7 = 7







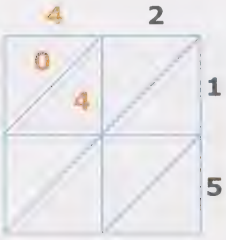
Notice the 0 in the tens for 1 x 7. That will be important.
Now, how does this apply to 2-digit by 2-digit multiplication?
Here is an example:

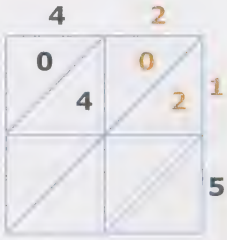
Example 7

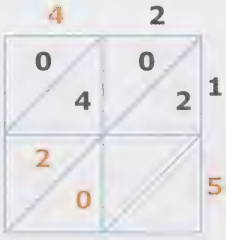
Multiply 42 x 15

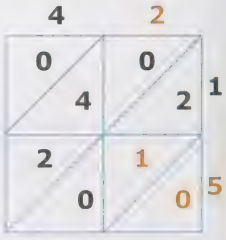
1. Set up your lattice with the 42 along the top and 15 down the right side:

2. Multiply each part as shown:





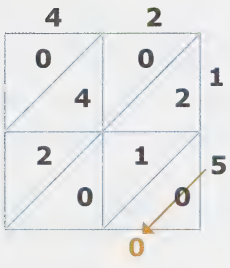




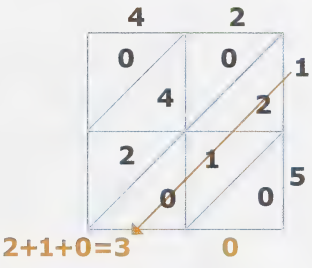
Notice that the products are being placed as we did with our smaller ones earlier. The tens digits are on top of the diagonal and the ones digits are on the bottom.

3. Now take the final lattice and add the diagonals in this order:

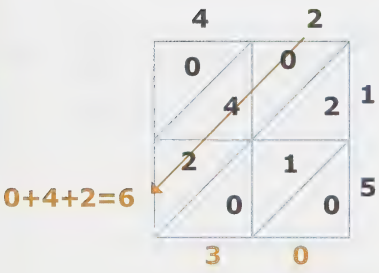
Diagonal 1



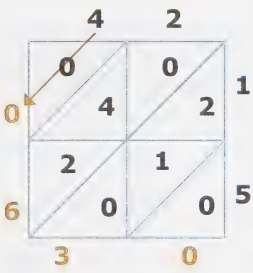
Diagonal 2



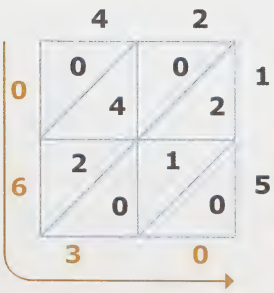
Diagonal 3



Diagonal 4



4. Now simply gather the digits from top left side to bottom right side of your box and THAT is the answer!



42 x 15 = 630

Leave off the 0 that is in the first position.

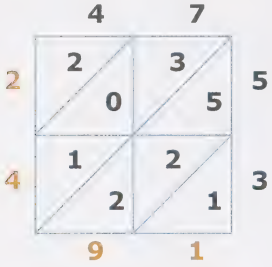
Example 8

Multiply 47 x 53. Estimate to check your answer.

Estimate using compensation first:

50 x 50 = 2 500

Using lattice multiplication:



Based on our estimate of 2 500, our answer 2 491 is reasonable.

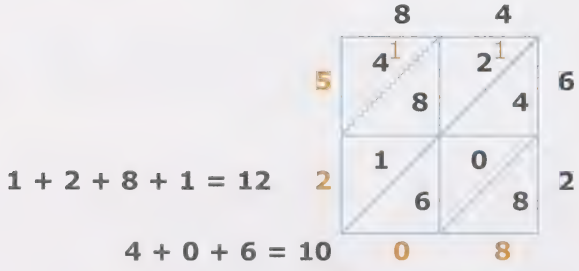
47 x 53 = 2 491

What if the sum of a diagonal is larger than 9? Simply carry the tens digit to the next diagonal to the left.

Example 9

Multiply 84 x 62. Estimate your solutions.

An estimate is 80 x 60 = 4 800



Notice that the 1s were carried to the next diagonal.

84 x 62 = 5 208

Let's Practice

- In your Workbook go to Unit 1, Lesson 10 and complete 1 to 25.

Problem Solving

Once you know how to multiply two digit numbers you are ready to solve problems involving multiplication. Here are some clue words you can look for in problems involving multiplication:

in all | per | product | of times | each | every

Example 10

Write a number sentence for the following problem. Solve.

Alyssa and Zach are planting trees for an environmental service project. They planted 12 rows of trees with 18 trees in each row. How many trees did they plant in all?

What is the question?
How many trees did they plant?
What do you know?
They planted 12 rows with 18 in each.
Write a number sentence:
12 x 18
Solve

$$\begin{array}{r} {\scriptstyle 1}\,18 \\ \times\ 12 \\ \hline 36 \\ +\ 180 \\ \hline 216 \end{array}$$

Check: Estimate by compatible numbers 20 x 10 = 200 so 216 is reasonable.
State the solution: Alyssa and Zach planted 216 trees.

Example 11

Write a number sentence for the following problem. Solve.

The new middle school has 84 classrooms. There are 24 brand new desks per classroom. How many students in total can be seated in the new classrooms at one time?

What is the question? How many seats are in the classrooms?
What do you know? 24 seats per room for 84 classrooms.
Write a number sentence: 84 x 24
Solve

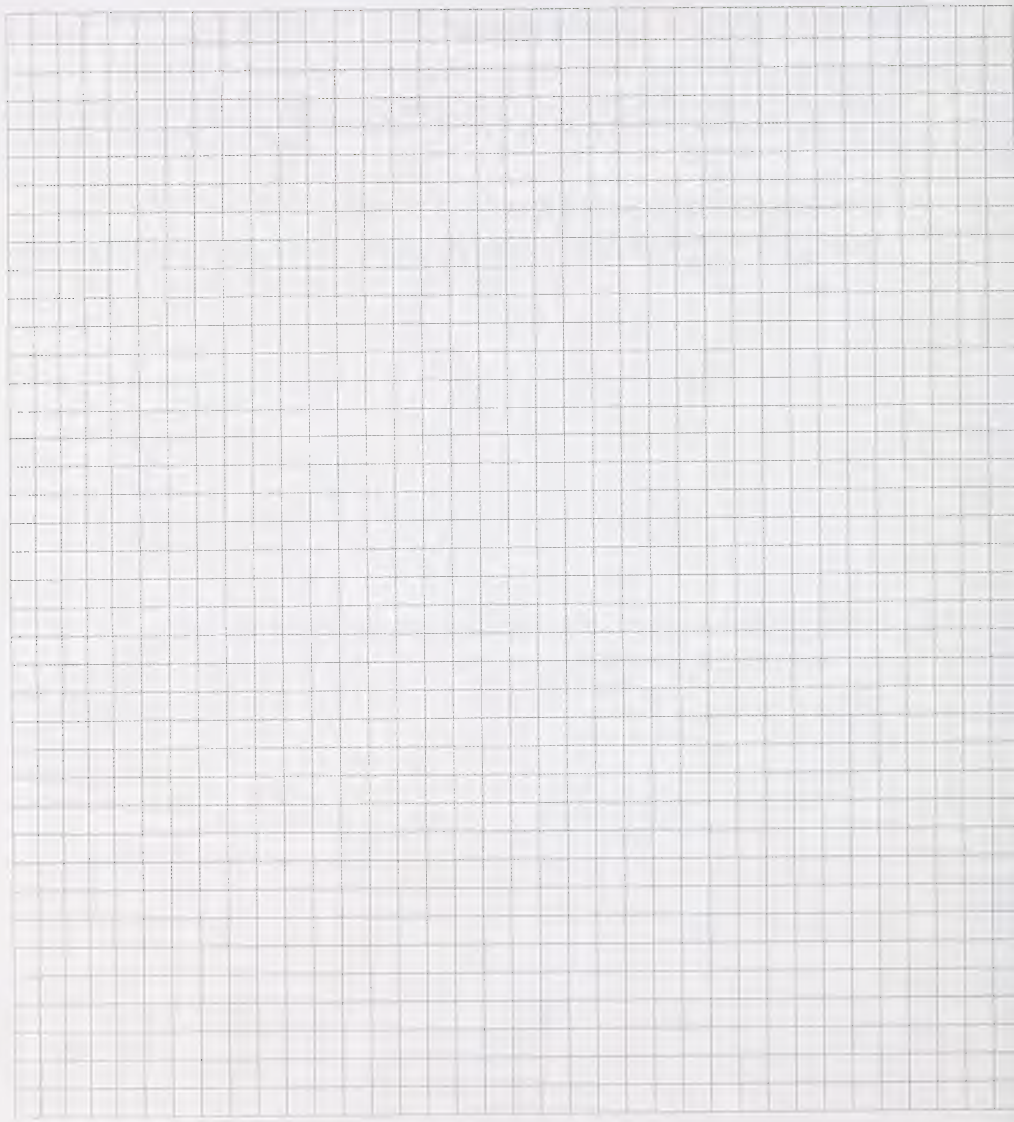
	84	
x	24	
	16	4 x 4
	320	4 x 80
	80	20 x 4
+	1 600	20 x 80
	2 016	

Check: Estimate by compatible numbers 80 x 20 = 1 600
State the solution: 2 016 students can be seated in the new classrooms at one time.

Let's Practice

- In your Workbook go to Unit 1, Lesson 10 and complete 26 to 31.

Go online to watch the Notepad Tutor:
Multiplication with Decimals (1-Digit Whole Number Multiplier).



Lesson 11

Division

Camping

Vacations do not always involve cars and hotels or airplanes. More people are discovering a love for the road by camping while travelling long distances. They pack tents, air mattresses, and sleeping bags. For cooking, gas stoves or campfires are used. Campers can go hiking, or swimming, or have campfires when they stop at a campground for the night.

There are many popular places across Canada to stop and camp. Canada's national parks are beautiful places to visit. In Alberta the national parks are Banff, Elk Island, Jasper, Waterton Lakes, and Wood Buffalo National Park.

It is 4 391 kilometres from Quebec to Banff National Park. Cameron's uncle and aunt plan to camp while they drive from Quebec to Banff to visit Cameron's family. They will drive for 5 days.

Reflection

How many kilometres will they travel each day if they travel for 5 days?

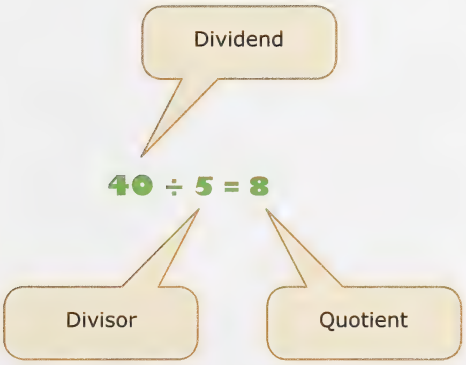
Objectives for this Lesson

In this lesson you will explore the following concepts:

- Divide 3-digit numbers by 1-digit numbers
- Find and interpret remainders in division problems
- Solve division problems

Dividing Numbers

Given two numbers, called the **divisor** and the **dividend**, we are able to find the number of times the divisor is contained in the dividend. Another way of putting this is that when we divide, we are to find what number times the divisor will equal the dividend. This answer is called the **quotient**.



Division is considered the **inverse** operation of multiplication. If you multiply 4 x 8 you get 32. If you start with the answer 32 and divide by the 4 or the 8 you will get the other number:

$4 \times 8 = 32$

$32 \div 4 = 8$

$32 \div 8 = 4$

Using multiplication, you can check your answers to the division problems to see if you are correct.

You will use your basic multiplication facts to 9 x 9 a lot for division. You may also have to work with **remainders**. When you divide 12 ÷ 5 you cannot get a perfect answer. 5 will divide into 12 twice but that leaves a remainder of 2 as shown in the picture below.

12 ÷ 5 = 2 R 2

You read this statement as "2 remainder 2." It means that you can make 2 groups of 5 from the 12 but there will be 2 left over.

You will sometimes have to use remainders in the process of long division.

Example 1

105 ÷ 7 = ?

Find the answer using long division.

1. Set up your division problem as: $\begin{array}{r}\text{quotient}\\ \text{divisor})\overline{\text{dividend}}\end{array}$

   $7\overline{)105}$

2. You cannot divide 7 into the 1 of the hundreds place. You will need to divide 7 into the tens place. Ask yourself: How many 7s are in 10? You should think 1.

   $\begin{array}{r}1\\ 7\overline{)105}\end{array}$

3. Now multiply 1 x 7 to get the product 7. Write this below the tens.

```
   1
7)105
  7
```

4. Now subtract the 7 from the 10.

```
   1
7)105
 -7
  3
```

5. Bring down the ones of the dividend.

```
   1↓
7)105
  7
  35
```

6. Divide 7 into the 35. Write the answer above the ones. Multiply 5 x 7 to get the product 35. Write this below the 35 and subtract.

```
   15
7)105
  7↓
  35
 -35
   0
```

The difference here is 0 so that means there is not a remainder. 105 divides into 7 equal parts of 15 without anything left over.

7. Check the quotient using multiplication. Remember, it is the inverse operation of division, meaning that if you multiply the quotient and the divisor you should get the dividend.

15 x 7 = 105

This means your answer checks.

105 ÷ 7 = 15

Example 2

138 ÷ 6

1. Write your problem in division form.

   $6\overline{)138}$

2. 6 doesn't divide into 1 so divide 6 into 13. It goes in 2 times. 2 x 6 = 12. Write the 12 below the 13.

   $$\begin{array}{r} 2 \\ 6\overline{)138} \\ \underline{12} \end{array}$$

3. Subtract 12 from 13 and bring down the 8 from the ones place.

   $$\begin{array}{r} 2 \\ 6\overline{)138} \\ \underline{-12}\downarrow \\ 18 \end{array}$$

4. Divide the 18 by 6. 6 goes into 18, 3 times. 3 x 6 = 18 so write that below the 18.

   $$\begin{array}{r} 23 \\ 6\overline{)138} \\ \underline{-12}\downarrow \\ 18 \\ \underline{18} \\ 0 \end{array}$$

5. Subtract 18 – 18. The remainder is 0.

6. Check by multiplying the quotient by the divisor.

   $$\begin{array}{r} {\scriptstyle 1} \\ 23 \\ \times\ 6 \\ \hline 138 \end{array}$$ 138 ÷ 6 = 23

Go online to watch the Notepad Tutor: Long Division 1-Digit Divisor by 3-Digit Dividend.

Long Division with Remainders

At times you may not get 0 after subtracting at the end. If that is the case you will have a remainder. Answers with remainders look like this:

Quotient	Meaning
25 R 3	25 Remainder 3
34 R 1	34 Remainder 1

The process for long division does not change, just the result. Remember, having a remainder means that the divisor does not go into the dividend evenly. The remainder is the number that is left over after dividing the dividend into equal parts based on the divisor.

Exploration 1: What Remains?

Materials: Unit 1, Lesson 11, Exploration 1 page from your Workbook, About 200 counters (dry beans will work), Pencil

1. Take 185 counters. Divide the counters into two equal groups.
2. How many counters are in each group?
3. How many counters are left out when you make two equal groups?
4. Write the answer to the problem 185 ÷ 2 in remainder form.
5. Divide the 185 counters into three equal groups.

6. How many counters are in each group?
7. How many counters are left out when you make three equal groups?
8. Write the answer to the problem 185 ÷ 3 in remainder form.
9. How many equal groups can you make with 185 that will have no remainder?
10. Take 150 counters. Divide the counters into 7 equal groups.
11. 150 ÷ 7 = ___?

The process for long division is the same with remainders. The following example will help you see how it ends.

Example 3

158 ÷ 7

1. Write your problem in division form.

   $7\overline{)158}$

2. Divide 7 into 15. 2 x 7 = 14. Write that below the 15.

   $$\begin{array}{r} 2 \\ 7\overline{)158} \\ \underline{14} \end{array}$$

3. Subtract 14 from 15 and bring down the 8 in the ones place.

   $$\begin{array}{r} 2 \\ 7\overline{)158} \\ \underline{14}\downarrow \\ 18 \end{array}$$

4. Divide the 18 by 7. There is no number that you can multiply 7 by to get 18, so you will have to get as close as you can. 2 x 7 = 14 will work. Write 2 x 7 = 14 below the 18.

$$\begin{array}{r} 22 \\ 7\overline{)158} \\ \underline{14}\downarrow \\ 18 \\ \underline{14} \end{array}$$

5. Subtract 18 – 14. The remainder is 4.

$$\begin{array}{r} 22 \\ 7\overline{)158} \\ \underline{14}\downarrow \\ 18 \\ \underline{14} \\ 4 \end{array}$$

6. Write the answer with the remainder:

   22 R 4

7. Check by multiplying the quotient by the divisor. Take the remainder and add it back to your product. If you get the dividend it is correct.

   154 + 4 = 158.

   Since this is the dividend, our answer is correct.

$$\begin{array}{r} {\scriptstyle 1} \\ 22 \\ \times\ 7 \\ \hline 154 \end{array}$$

158 ÷ 7 = 22 R 4

- In your Workbook go to Unit 1, Lesson 11 and complete 1 to 15.

Using Remainders

Remainders are used all the time. They are not numbers that can be discarded in real world problems. Think of this situation:

Mrs. Joyce's fifth grade class will take a field trip next week. The vans they rent will hold 8 people each. There are 30 people going on the trip.

How many vans will they need to rent?

You can divide to get the number of vans:

$$\begin{array}{r} 3 \\ 8\overline{)30} \\ \underline{24} \\ 6 \end{array} \qquad 3 \text{ R } 6$$

There will be 3 vans with 8 people in each. The remainder is the number of people that will be left over after the 3 vans are filled. So do you only need 3 vans? No! This answer leads us to two options for the situation:

Option 1: You will have to rent one van for the extra 6 people that don't fit in the first three vans. That means you will need to rent 4 vans.

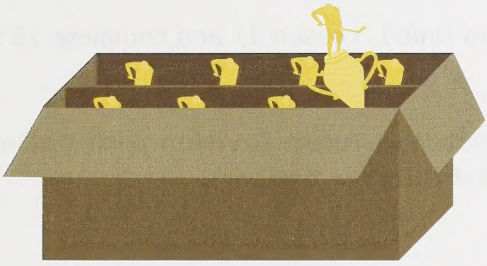
or

Option 2: You rent only 3 vans, leaving 6 people out.

You will have to analyze remainders to determine what may be done with the numbers in a real world context.

Example 4

The hockey team has ordered trophies for the end-of-season banquet. There are 158 awards and each box holds 8 awards. How many awards will be in the partially filled box?



1. What are you looking for? — The number of awards in the last box
2. How can you find it? — Each box holds 8 so divide 158 by 8 and look for the remainder.
3. Write a number sentence — $158 \div 8$
4. Divide

$$\begin{array}{r} 19 \\ 8\overline{)158} \\ \underline{-\ 8\downarrow} \\ 78 \\ \underline{-\ 72} \\ 6 \end{array}$$

5. Analyze the answer: — The quotient 19 tells us we have 19 boxes of 8. The remainder 6 is the number of trophies in the partially filled box.

   There will be 6 trophies in the last box.

Let's Practice

- In your Workbook go to Unit 1, Lesson 11 and complete 16 to 21.

Go online to watch the Notepad Tutor: Division with Decimals (3-Digit by 1-Digit Natural Number Divisor).

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